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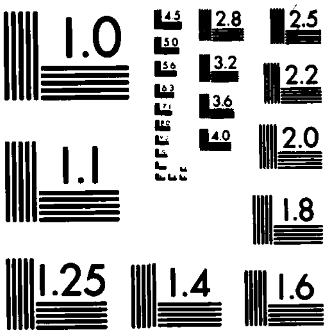

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MAY 1983 CAORA/TR-6/83

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AMMUNITION RESUPPLY MODEL PROGRAMMER'S MANUAL VOLUME II

TECHNICAL REPORT 6/83

UNITED STATES ARMY COMBINED ARMS CENTER

DIRECTORATE OF STUDIES AND ANALYSIS
COMBINED ARMS OPERATIONS RESEARCH ACTIVITY
FORT LEAVENWORTH, KS 66027

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COMBINED ARMS OPERATIONS RESEARCH ACTIVITY
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30 June 1983

SUBJECT: Documentation of the Ammunition Resupply Model

TO: SEE DISTRIBUTION

Included find your copy or copies of the latest (May 1983) three volume documentation of the CAORA developed Ammunition Resupply Model. For those not already familiar with the system, this supercedes all previous ARM documentation. For others it extends earlier documentation to include several significant program modifications and the use of a different computer system.

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Errata Sheet

P. 69 of Volume I ARM Methodology and User's Manual should be replaced with the following:

USER RESPONSES AND SYSTEM MESSAGES	REMARKS
ENTER NUMBER OF ACTIVE ATPS 6	
ENTER NUMBER OF ACTIVE ASPS 4	
TIME = 2160.05 ?	Current simulation time menu option
4	The RETURN option
TIME = 2160.1	This is the end of simulation time
SSG ARMPL.FREE, THEN SSG ARMPL. EDITYES	To remind the user. This now begins a process of editing data for following CI.
@ SSG ARMPL.FREE	Putting ARMPL.FREE into machine readable form.
SSG 20R1 S74T27	Machine reply
SGS	To input information to SSG.
FREE CI(N) @	Tells machine which files to free.
END SSG ERRORS 0/0/0 RETAIN LEVEL 1.2	End of input files are now free and symmed to the printer
@ SSG ARMPL.EDITYES	Putting ARMPL.EDITYES into machine.
SSG 20R1574T27	Above entry processed to input CI nos to SSG.
EDIT CI(N), CI (N+1)	CI(N) to be edited and renamed CI(N+1)
@ XQT ARMPL.EDIT ZERO COUNTERS (YES or NO) YES	Execute the EDIT program
???	EDIT menu option. This is now the same as in previous chapter Building and Editing data files.

Technical Report TR 6-83
May 1983

Directorate of Studies and Analysis
US Army Combined Arms Operations Research Activity
Fort Leavenworth, KS 66027

AMMUNITION RESUPPLY MODEL

VOLUME II

PROGRAMMERS MANUAL

by

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and
Mr. Rick Cunningham

ACN 65676

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Director, S&AD

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83-4046

A

REPORT DOCUMENTATION PAGE

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Ammunition Consumption Rates

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report is the second of three volumes that describe the Ammunition Resupply Model (ARM). The model was designed to simulate those activities associated with ammunition resupply. This manual contains the FORTRAN code of the ARM simulation and a description of the major event subroutines. Volume I contains the user instructions and methodology of the ARM model. The third volume contains a standard European Heavy division data base.

ABSTRACT

This manual is the second of three volumes produced to document the Ammunition Resupply Model. The Ammunition Resupply Model (ARM) was designed to simulate those activities associated with ammunition resupply in parallel with the play of existing war games. Its purpose is to assess the capability of a given TOE structure to respond to the logistical demands placed upon it by various numbers of ammunition-expending weaponry and/or to assess the capability of existing or proposed resupply systems (i.e., number, location, or sizes of Ammunition Transfer Points (ATP) and Ammunition Supply Points (ASP)). This report contains the FORTRAN code and a discussion of the major subroutines of the Ammunition Resupply Model. Volume I contains a discussion of model methodology, database development, and operators guide. The third volume contains a description of a standard heavy European Division data base along with data sources.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Cont'd)

CHAPTER 1

1. INTRODUCTION.

a. This manual is intended for the programmer who has the task of maintaining, transfering or modifying the Ammunition Resupply Model (ARM). This manual contains listings and discussion of the ARM simulation, as well as routines for editing data and events, and a demand generation program.

(1) Chapter one contains general information about the ARM model; including files, common blocks, and subroutine calling sequences.

(2) Chapter two gives a detailed description of the major event subroutines in ARM.

(3) Chapter three lists the FORTRAN code for the ARM model and the UNIVAC executive language runstreams that drive the program.

2. GENERAL INFORMATION.

a. ARM Summary. ARM is a set of FORTRAN subroutines designed to assist an analyst in studying the ammunitior flow from the Corps Storage Area (CSA) to the weapons. ARM also models the operations of the Ammunition Transfer Points (ATPs) and Ammunition Supply Points (ASPs). Additional information can be found in volume one-Methodology.

b. Program Specifications.

(1) Language and operating system. ARM is written in standard FORTRAN 77, and runs on the TRADOC Data Processing Field Office (DPFO) UNIVAC 1100/80. The driving runstreams in chapter 3 are written for the UNIVAC Symbolic Stream Generator (SSG processor). Their function is to assign the input and output files for ARM.

(2) Program size. There are 49 subroutines,.consisting of about 5000 lines of code, in ARM. This produces about 20000 words of instrutions on the UNIVAC, and requires about 50,000 words in the data bank.

(3) Operating Environment. ARM requires an interactive (demand) terminal with a printer and/or a CRT. Output can be routed to a high speed line printer.

3. AN ARM OVERVIEW.

a. Major groups of subroutines perform the following functions:

(1) Event Processing.
(2) Vehicle Queue Processing.
(3) Event Storage and Retrieval.
(4) Input and Output.

b. Event Processing. These subroutines simulate the flow of ammunition from the Corps Storage Area (CSA) down to the consuming weapon systems. The events are ASP, ASPARV, ASPAR1, ASPAR2, ATP, ATPARV, ATPAR1, ATPAR2, CONTRL, CSAARV, CSADEP, DEMAND, ENDSIM, HASPAR, HELARV, RELOAD, REPORT, UNTARV, and UNTDEP. Additional subroutines that aid in event processing include: ASPCK, DEPASP, DUALMX, INTRDK, LDPWDR, OPERA, RDIEXO, RDJIFF, and SERVER. A brief explanation of each is in chapter 2.

c. Vehicle Queue Processing. These subroutines, in general, keep track of all vehicles used in ARM by performing various functions on them in the queue appopriate to the event being simulated. FINTK, GETONE, GETQUE, NXTQUE, PUTQUE, and SETQUE all perform vehicle queue operations (see chapter 3 for definition of each). A summary of vehicle queue functions is presented in paragraph 7.

d. Event storage and retrieval subroutines are made up of CREEVT, GETEVT, NEXTEV, PUTEVT, SCHED, and SEVENT. This group of subroutines allow the list of events in ARM (Events Queue) to be kept current and executable. Paragraph 6 explains how events are scheduled.

e. Input and Output. This grouping permits various input/output operations, including editing of data and printing various output.

(1) Initialization, input and output for ARM is performed by EVSTOP, INIT, QINIT, READF, TRKPUT, TRKTIM, TRUCK, and PRINT.

(2) The ARM program may be supplemented by the EDIT program which provides the capability of editing the database between Critical Incidents (CIs). Editing between CIs provides the ability to replicate results of the following CI. The following subroutines make up program EDIT:

EDIT (main)
EDITD
GETONE
GETQUE
NXTQUE
PRINT
PUTQUE
READF
SETQUE
TRKPUT

Note that most of the EDIT program subroutines are also found in the ARM simulation. Additional programs used to edit event parameters, are found in Volume I.

f. Subroutine Calling Sequences.

(1) All of the routines in ARM are directly called by other subroutines or the main program, except for the function IQ (which returns the proper vehicle queue number from parameters). Initially listed are those subroutines which are called by the MAINARM program; subsequently, all subroutines are cross-referenced by calling sequences. Additionally, common blocks that are referenced by calling subroutine are provided.

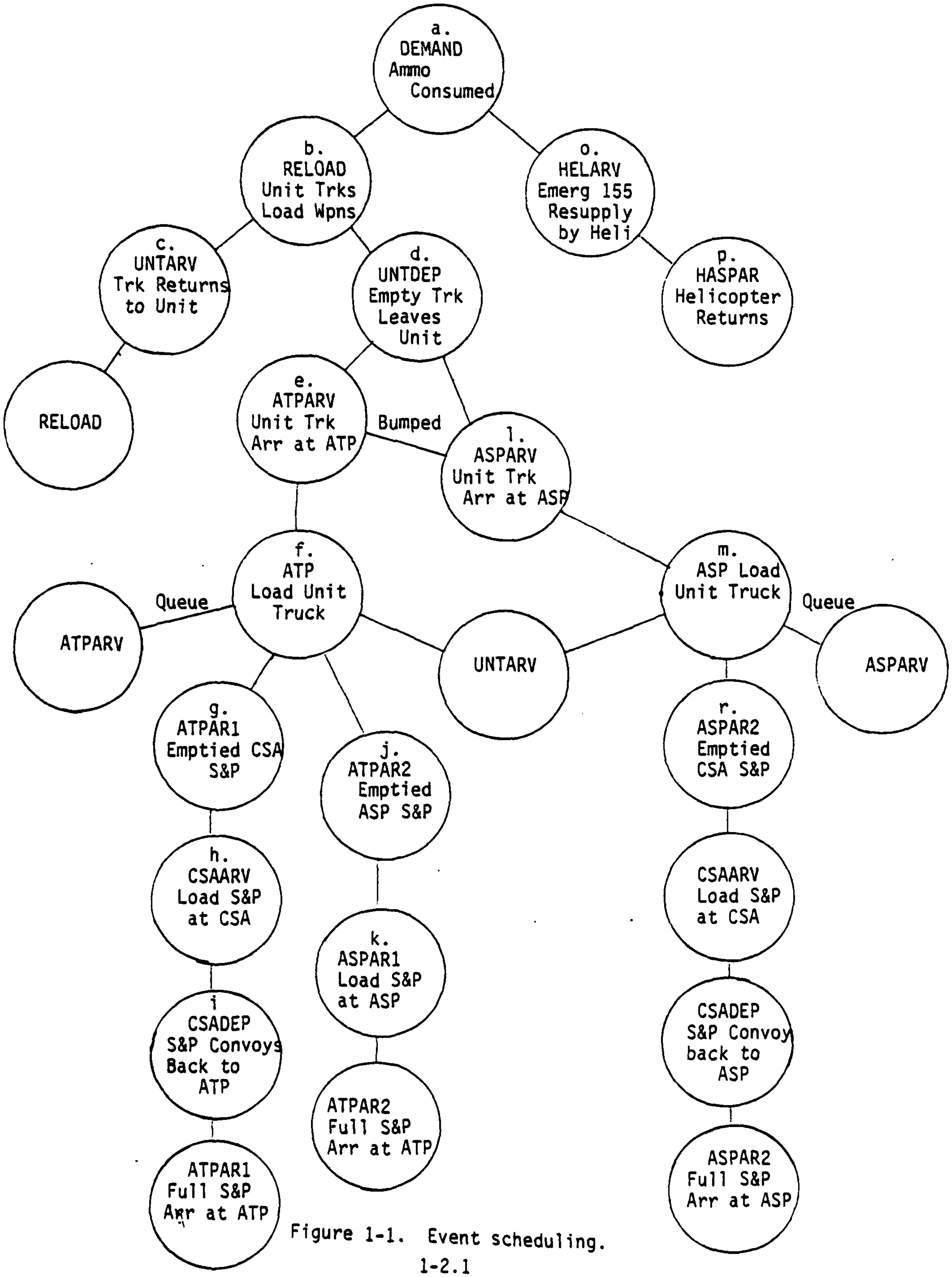

a. DEMAND Ammo Consumed
b. RELOAD Unit Trks Load Wpns
o. HELARV Emerg 155 Resupply by Heli
c. UNTARV Trk Returns to Unit
d. UNTDEP Empty Trk Leaves Unit
p. HASPAR Helicopter Returns
RELOAD
e. ATPARV Unit Trk Arr at ATP
Bumped
l. ASPARV Unit Trk Arr at ASP
f. ATP Load Unit Truck
m. ASP Load Unit Truck
Queue
ATPARV
UNTARV
Queue
ASPARV
g. ATPAR1 Emptied CSA S&P
j. ATPAR2 Emptied ASP S&P
r. ASPAR2 Emptied CSA S&P
h. CSAARV Load S&P at CSA
CSAARV Load S&P at CSA
k. ASPAR1 Load S&P at ASP
i CSADEP S&P Convoys Back to ATP
CSADEP S&P Convoy back to ASP
ATPAR2 Full S&P Arr at ATP
ATPAR1 Full S&P Arr at ATP
ASPAR2 Full S&P Arr at ASP

Figure 1-1. Event scheduling.

(2) Events are subroutines that are allowed to be scheduled at some future time, that is, the calling arguments are stored (in a queue) along with the time in the simulation that the event is to happen. When the event time comes to pass, the calling arguments (or parameters) are retrieved from the queue by GETEVT and the event subroutine is called directly by MAINARM. In this way, event execution may be delayed by a given amount of time from when the event was scheduled. The event type (e.g., type 1 is DEMAND) is saved in the passing argument list (IPARM(5)) so that MAINARM can determine which event subroutine to call. The event type is specified at the time the event is scheduled.

(3) Table 1-1 lists all of the ARM subroutines and what they call. Table 1-2 lists the subroutines in the EDIT program and which other subroutines are referenced (called) by each, and which routines reference each. In contrast to Table 1-1, Table 1-3 contains all subroutines and where they were called from (the event type appears at the left column). Tables 1-4 and 1-5 deal with scheduled (as opposed to called directly) events: what routine schedules what; and what routine is scheduled by what, respectively (the numbers in parenthesis are event numbers).

Table 1-1.

EVENT		
MAINARM Calls	Common	Calls
INIT	AUNIT EVENTS LOG QUENUM QUEPUT	QINIT,SEVENT,SCHED,TRKTIM,CONTRL, RDJIFF
NEXTEV		
LOOKEV	LOG	
1 DEMAND	LOG	RDIEXO,SCHED,OPERA
2 RELOAD	LOG	IQ,DUALMX,FINTK,INTRDK,SCHED,OPERA
3 UNTDEP	LOG	OPERA,INTRDK,SCHED
4 ATPARV	LOG	SCHED,IQ,FINTK,PUTQUE,GETQUE,OPERA, INTRDK
5 ASPARV	LOG	SCHED,IQ,ASPCK,GETQUE,PUTQUE
6 ATP	LOG	IQ,FINTK,SCHED,OPERA,LDPWPR,INTRDK
7 ASP	LOG	IQ,FINTK,SCHED,OPERA,INTRDK
8 UNTARV	LOG	DEPASP,SERVER,IQ,PUTQUE,SCHED
9 CSAARV	LOG	PUTQUE,SCHED,GETQUE
10 ATPAR1	LOG	OPERA,SCHED,IQ,PUTQUE,GETQUE,INTRDK
11 ATPAR2	LOG	IQ,PUTQUE,OPERA,INTRDK,SCHED
12 ASPAR1	LOG	IQ,PUTQUE,OPERA,SCHED,FINTK,GETQUE, INTRDK
13 ASPAR2	LOG	PUTQUE,GETQUE,OPERA,INTRDK,SCHED,IQ, SERVER

Table 1-1. (Cont'd)

EVENT

MAINARM Calls	Common	Calls
14 HELARV	LOG	OPERA, SCHED
15 HASPAR	LOG	
16 CSADEP	LOG	OPERA, INTRDK, SCHED, PUTQUE, GETQUE
17 REPORT	AUNIT LOG	TRUCK
18 CONTRL		EDITD, REPORT, SCHED, CREEVT
19 ENDSIM	AUNIT LOG QUENUM QUEPUT	
EVSTOP	EVENTS	

Subroutine	Common	Calls
ASPCK	LOG	SCHED, OPERA
CREEVT		READF, SCHED
DEPASP	LOG	GETQUE, SCHED, PUTQUE
DUALMX	LOG	IQ, FINTK, INTRDK, SCHED
EDITD	AUNIT LOG	READF
FINTK	LOG	GETQUE, PUTQUE
GETEVT	EVENTS	
GETONE	QUENUM QEUPNT	
GETQUE	QUENUM QUEPNT	
INTRDK	LOG	
IQ		
LDPWDR	LOG	IQ, FINTK, PUTQUE
OPERA	LOG	
PUTEVT	EVENTS	
PUTQUE	QUENUM QUEPNT, LOG	
QINIT	EVENTS	
RDIEXO	LOG	SCHED
RDJIFF	AUNIT LOG	SCHED
READF		
SCHED		LOOKEV, PUTEVT, CONTRL
SERVER	LOG	PUTQUE, SCHED, GETQUE, IQ, FINTK, OPERA
SEVENT		SCHED
TRKPUT		READF, NXTQUE, GETQUE, PUTQUE, SETQUE, GETONE
TRKTIM	LOG	
TRUCK	AUNIT LOG	
MAINARM	AUNIT LOG QUENUM QUEPNT	

TABLE 1-2

Routine	Called by
EDITD	EDIT
GETONE	TRKPUT
GETQUE	EDIT,PRINT,TRKPUT
NXTQUE	PRINT,TRKPUT
PUTQUE	EDIT,PRINT,TRKPUT
READF	EDITD, TRKPUT
SETQUE	TRKPUT
TRKPUT	EDIT

Routine	Common	Calls
EDIT	AUNIT LOG QUENUM QUEPNT	EDITD,GETQUE,PRINT,PUTQUE,TRKPUT
EDITD	AUNIT LOG QUENUM QUEPNT	READF
GETQUE	QUENUM QUEPNT	
NXTQUE	QUENUM QUEPNT	
PRINT	QUENUM QUEPNT	GETQUE,NXTQUE,PUTQUE
PUTQUE	LOG QUENUM QUEPNT	
READF		
SETQUE	QUENUM QUEPNT	
TRKPUT		GETQUE,NXTQUE,PUTQUE,READF,SETQUE

Table 1-3.

Event Number	Subroutine	Called by
7	ASP	MAINARM
12	ASPAR1	MAINARM
13	ASPARA2	MAINARM
5	ASPARV	MAINARM
	ASPCK	ASPARV
6	ATP	MAINARM
10	ATPAR1	MAINARM
11	ATPAR2	MAINARM
4	ATPARV	MAINARM
18	CONTRL	INIT, MAINARM, SCHED
	CREEVT	CONTRL
9	CSAARV	MAINARM
16	CSADEP	MAINARM
1	DEMAND	MAINARM
	DEPASP	UNTARV
	DUALMX	RELOAD
	EDITD	CONTRL
19	ENDSIM	MAINARM
	EVSTOP	MAINARM
	FINTK	ASP, ASPAR1, ATP ATPARV, DUALMX, LDPWDR, RELOAD, SERVER
	GETEVT	NEXTEV
	GETONE	TRKPUT

Table 1-3. (Cont'd)

Event Number	Subroutine	Called by
	GETQUE	ASPAR1 ASPAR2, ASPARV, ATPAR1, ATPARV, CSAARV, CSADEP, DEPASP, FINTK, SERVER
15	HASPAR	MAINARM
14	HELARV	MAINARM
	INIT	MAINARM
	INTRDK	ASP, ASPAR1, ASPAR2, ATP, ATPAR1, ATPAR2, ATPARV, CSADEP, DUALMX, RELOAD, UNTDEP
	IQ	ASP, ASPAR1, ASPAR2, ASPARV, ATP, ATPAR1, ATPAR2, ATPARV, DUALMX, LDPWDR, RELOAD, SERVER UNTARV
	LDPWDR	ATP
	LOOKEV	MAINARM
	NEXTEV	MAINARM
	OPERA	ASP, ASPAR1, ASPAR2, ASPCK, ATP, ATPAR1, ATPAR2, ATPARV, CSADEP, DEMAND, HELARV, RELOAD, SERVER, UNTDEP
	PUTEVT	SCHED
	PUTQUE	ASPAR1, ASPAR3, ASPARV, ATPAR1, ATPAR2, ATPARV, CSAARV, CSADEP, DEPASP, FINTK, LDPWDR, SERVER, UNTARV
	QINIT	INIT
	RDIEXO	DEMAND
	RDJIFF	INIT

Table 1-3. (Cont'd)

Event Number	Subroutine	Called by
	READF	CREEVT, EDITD, TRKPUT
2	RELOAD	MAINARM
17	REPORT	CONTRL, MAINARM
	SCHED	ASP, ASPAR1, ASPAR2, ASPARV, ASPCK, ATP, ATPAR1, ATPAR2, ATPARV, CONTRL, CREEVT, CSAARV, CSADEP, DEMAND, DEPASP, DUALMX, HELARV, INIT, RDIEXO, RDJIFF, RELOAD, SERVER, SEVENT, UNTARV, UNTDEP
	SERVER	ASPAR2, UNTARV
	SEVENT	INIT
	TRKPUT	CONTRL
	TRKTIM	INIT
	TRUCK	REPORT
8	UNTARV	MAINARM
3	UNTDEP	MAINARM

TABLE 1-4

EVENT		
NUMBER	NAME	SCHEDULED BY
1	DEMAND	RDIEXO,RDJIFF
2	RELOAD	DEMAND,UNTARV
3	UNTDEP	DUALMX,RELOAD
4	ATPARV	ATP,ATPARV,UNTDEP
5	ASPARV	ASP,ASPARV,ASPCK, ATP,ATPARV,DUALMX, RELOAD,UNTDEP
6	ATP	ATPARV,DEPASP,SERVER
7	ASP	ASPARV,DEPASP,SERVER
8	UNTARV	ASP,ASPAR1,ATP, DUALMX,RELOAD,SERVER
9	CSAARV	ASPAR2,ASPAR1
10	ATPAR1	ATP,ATPAR1,CSADEP
11	ATPAR2	ASPAR1,ASPAR2,ATP
12	ASPAR1	ASPAR1,ASPAR2,SERVER
13	ASPAR2	ASP,ASPAR1,ASPAR2, ATPAR1,CSADEP,SERVER
14	HELARV	DEMAND
15	HASPAR	DEMAND,HELARV
16	CSADEP	CSAARV
17	REPORT	
18	CONTRL	CONTRL
19	ENDSIM	CONTRL, INIT

Table 1-5

EVT#	Routine	Schedules
(7)	ASP	(5) ASPARV, (8) UNTARV, (13) ASPAR2
(12)	ASPAR1	(12) ASPAR1, (13) ASPAR2, (8) UNTARV, (11) ATPAR2
(13)	ASPAR2	(9) CSAARV, (13) ASPAR2, (11) ATPAR2
(5)	ASPARV	(5) ASPARV, (7) ASP
	ASPCK	(5) ASPARV
(6)	ATP	(4) ATPARV, (5) ASPARV, (8) UNTARV, (10) ATPAR1, (11) ATPAR2
(10)	ATPAR1	(13) ASPAR2, (10) ATPAR2, (9) CSAARV
(11)	ATPAR2	(12) ASPAR1
(4)	ATPARV	(5) ASPARV, (6) ATP, (4) ATPARV
	CREEVT	SCHEDULES ANY EVENT
(18)	CONTRL	(18) CONTRL, (19) ENDSIM
(9)	CSAARV	(16) CSADEP
(16)	CSADEP	(10) ATPAR1, (13) ASPAR2
(1)	DEMAND	(2) RELOAD, (15) HASPAR, (14) HELARV
	DEPASP	(7) ASP, (6) ATP
	DUALMX	(5) ASPARV, (3) UNTDEP, (8) UNTARV
(14)	HELARV	(15) HASPAR
	INIT	(19) ENDSIM
	RDIEXO	(1) DEMAND
	RDJIFF	(1) DEMAND
(2)	RELOAD	(5) UNTDEP, (8) UNTARV

EVT#	Routine	Schedules
	SERVER	(8) UNTARV, (6) ATP, (7) ASP, (12) ASPAR1, (13) ASPAR2
	SEVENT	SCHEDULES ANY EVENT
(8)	UNTARV	(2) RELOAD
(3)	UNTDEP	(5) ASPARV, (4) ATPARV

4. File Usage

a. The ARM program use the following files (see Volume I for details):

2 Audit trail (output), a listing of all events that were scheduled or executed.

3 Database input at start of CI.

4 Database output at the end of the CI.

7 Events file, input, to be executed during this CI (generated by previous CI).

8 Events file, output, to be executed during the next CI.

9 Demand (input), the expenditure rates for the unit weapons.

11 Additional events (input) to be executed this CI. This file is manually built in program ADDEVT (see Volume I).

14 Unit status report output.

b. Program EDIT uses these files:

2 Printout of truck queues.

3 Database input to be edited.

4 Database output after editing.

13 Distance file, input, to be stored in the IUNIT array distance attributes. The distances must change to reflect unit movement (see Volume I).

5. COMMON BLOCKS.

a. EVENTS. EVENTS is the events queue. It is accessed from: INIT, EVSTOP, GETEVT, PUTEVT, QINIT. An explanation of how it is used can be found in paragraph 6. The common declaration is referenced with the "include events" statement:

```
COMMON/EVENTS/JSTAT(6), JEVDS(2048, 4), IEVS(5, 2048)
```

b. QUENUM. Contains IHEAD, the list of last item in queue for vehicle queues (see paragraph 6):

```
COMMON/QUENUM/IHEAD(176)
```

c. QUEPNT. The ITEMS in the vehicle queue are held in common QUEPNT. QUEPNT is used in association with QUENUM (see paragraph 6):

```
      COMMON/QUEPNT/ITEMS(1400)
```

d. AUNIT. Contains the alphabetic unit names:

```
      COMMON/AUNIT/AUNIT(75,2)
```

e. LOG. Contains the database for the ARM model (see volume I for the array definitions):

```
      COMMON/LOG/IATP(10,53), IASP(10,110), IUNIT(75,142),
     Z  ITRUCK(1400,15), ITYPE(9,6), IMIX(91,32), INTER(10),
     Z  IRSTME(23,3), IATPSD(5), IDAY, TIME,
     Z  IATPAM(10,40), ICSA(3,32), LPPAR(10), IASPAM(10,120),
     Z  LUOUT, TCIST, TCILNG, LOOK(19), JUNIT(8,24),
     Z  JATP(10,6), JASP(10,9), IATPSP(10,22),
     Z  IASPSP(10,30), IAMLVL(2,30), ISERV(10)
```

6. THE EVENTS QUEUE.

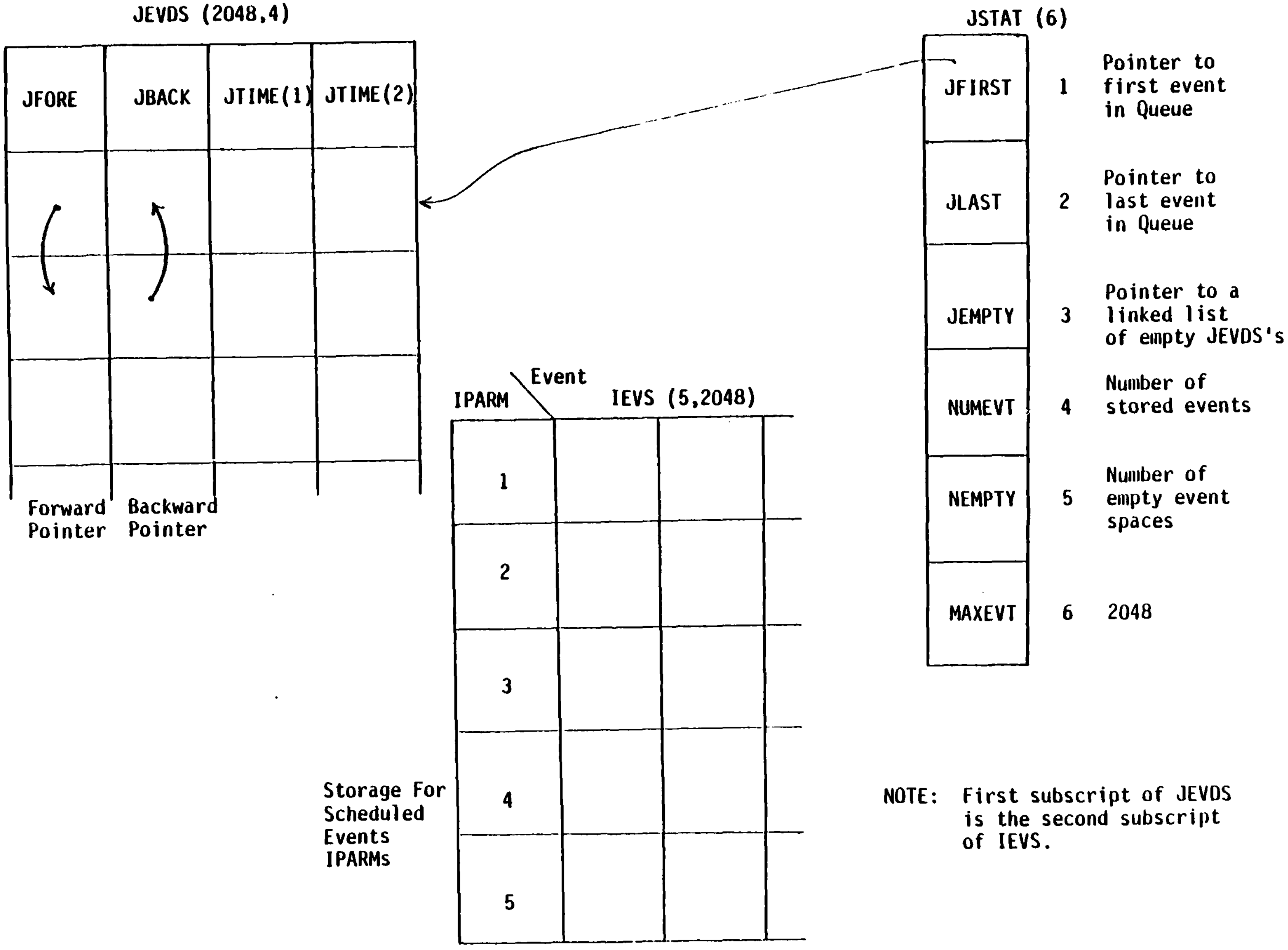
a. The flexibility of ARM comes from the ability of its subroutines to schedule events to happen at some future time. On the most fundamental level, this is done by sorting the events in chronological order and storing them in the events queue (list) for future processing.

b. Events are scheduled by calling subroutine SCHED and passing the event type (see table 1-1), calling arguments and the time the event is to take place. SCHED calls PUTEVT to put the event in the event queue.

c. The parameters (arguments) associated with the event at the time it was scheduled are the thing that makes that event unique. For example, if a truck is scheduled for an event at some future time, the first of five parameters is generally the truck number. The parameter list for an event is usually given the name IPARM.

d. If an event is scheduled at the current time, (i.e., no delay is assessed at time of scheduling) then that event will be the first event in queue (next to be executed), even if there were events scheduled for that time previously.

e. The structure of the events queue may be found in figure 1-2. In general, JEVDS is a doubly linked list of events, sorted by time. The double linkage allows insertion from either the front or rear. IEVS contains the parameters (IPARMs) associated with the event when it was scheduled JSTAT(1) contains the subscript to JEVDS and IEVS of the next event in queue (front). Subsequent events are found by following the subscript to the next event (found in JEVOS (IFIRST,1), and so on).



NOTE: First subscript of JEVDS is the second subscript of IEVS.

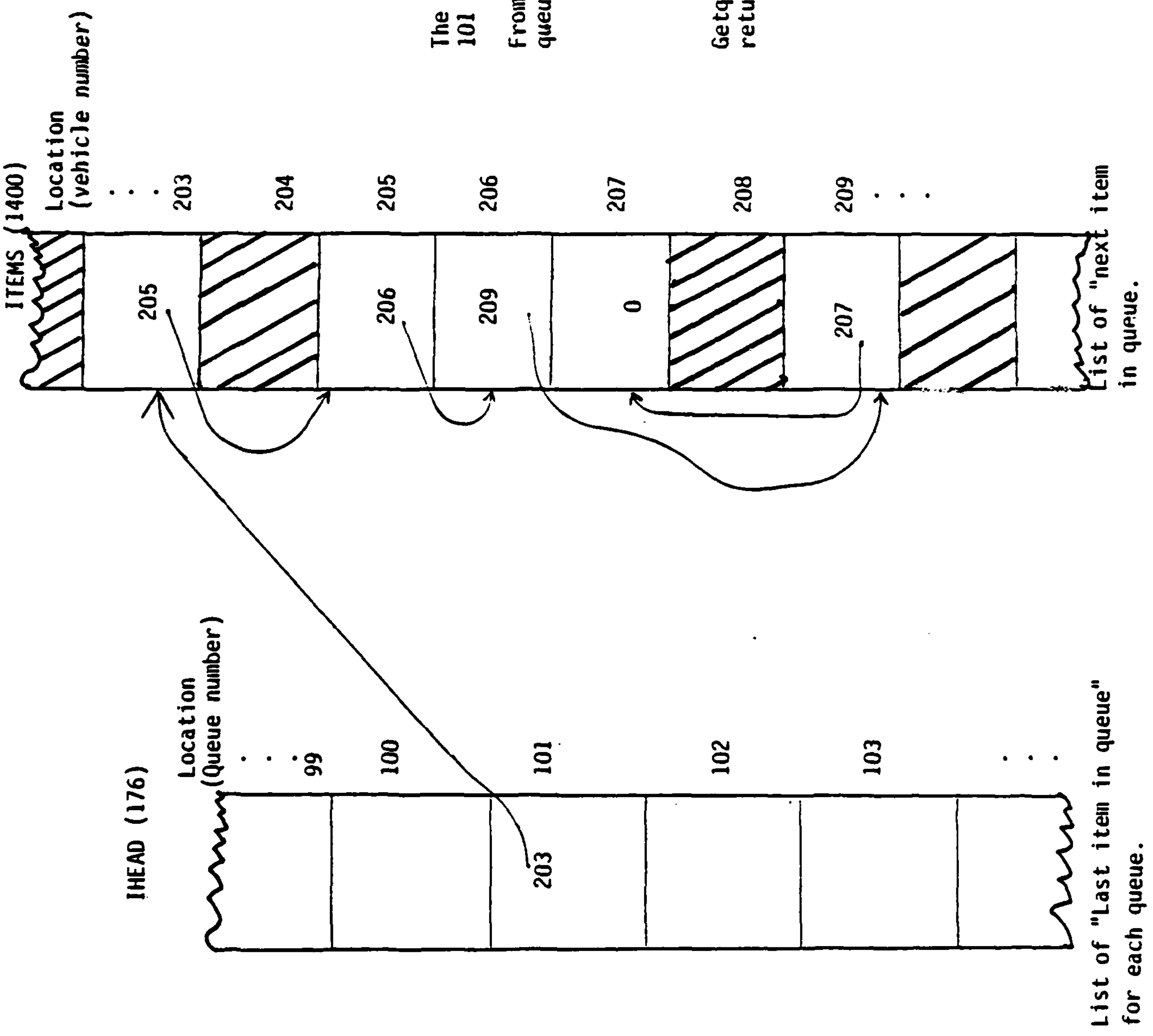
Figure 1-2. Events Queue.

7. VEHICLE QUEUES.

a. Because several vehicles may wait in the same place at a given time, a vehicle queueing system has been set up for ARM. To put a vehicle (NTRUCK) in queue (NQUEUE), a subroutine must "CALL PUTQUE (NTRUCK, NQUEUE)." Similarly to pull a vehicle from queue, a "CALL GETQUE (NTRUCK, NQUEUE)" is executed.

b. There are two arrays that make up the vehicle gueues (see figure 1-3), IHEAD and ITEMS. IHEAD is found in common block QUENUM; ITEMS is in QUEPNT. IHEAD (NQUEUE) contains the number of the last vehicle in queue "NQUEUE." The vehicle in front of NTRUCK in queue is given by ITEMS(NTRUCK). In order to get to the first item in queue, it is necessary to traverse through the pointers until you reach the element of array ITEMS that contains a zero.

c. Since IHEAD is dimensioned to 176, there are 176 possible queues. ITEMS is dimensioned to 1400, so there are 1400 vehicles that can be in any combination of the 176 queues.



The first item in queue 101 is 207.

From back forward, this queue is:
203
205
206
209
207

Getque (N,101) would return 207 in "N".

Figure 1-3. Truck Queues.

CHAPTER 2

1. MAINARM.

a. The general logic of MAINARM is as follows:

(1) Initialize, read database.

(2) The following is repeated until simulation end:

Get an event.
Process the event.

(3) Write out the database for the next CI.

(4) Stop.

b. Initialization Routines.

(1) INIT. INIT reads the database from file 3. The database is held in common for the rest of the Critical Incident (CI). This allows all of the events to modify the data. The list of the arrays in the database and their definitions can be found in Volume I. INIT gives the operator access to the ARM menu by calling CONTRL.

(2) INIT calls RDJIFF which reads the demand file (file 9) and updates the demand attributes in the IUNIT array for each ammo type. RDJIFF schedules the first DEMAND pulse (for each unit) for the CI.

c. Event Processing: MAINARM processes events as they appear in the 'events queue' (common events, see paragraph 6, Volume II). NEXTEV retrieves the next scheduled event by calling GETEVT. MAINARM calls LOOKEV to print the event message on the audit trail (file 2).

Event subroutines are called from MAINARM dependent on the event type (IPARM(5), see Table 1-1 for explanation of the codes), until the event ENDSIM is processed.

2. EVENT DESCRIPTIONS.

a. DEMAND. DEMAND simulates the ammunition consumption at the unit level. DEMAND calls RDIEXO to fire that portion of the CI's ammunition demand allocated to this pulse (an instantaneous expenditure of ammunition as represented by the scenario and demand generation process). For a maneuver unit, all of the demand is fired (at the end of the CI), because they are only pulsed once per CI. For multipulse units, RDIEXO schedules the next DEMAND event for this CI. For artillery units, the DEMAND event is scheduled every 60 minutes. For 155mm units, if current supply plus ammunition on trucks is less than the critical resupply level, an emergency helicopter resupply event

(HELARV) is scheduled. RDIEXO expends the ammunition by subtracting part of the demand from the current supply. If current supply per weapon falls below the routine resupply level for at least one ammunition type, a RELOAD event is scheduled immediately.

b. RELOAD.

(1) RELOAD transfers ammunition from the unit trucks to the weapons. The number of rounds to be taken from each truck is determined by taking the total requirements of the unit divided by the number of weapons needing ammunition (from IUNIT array). Transfer is accomplished by multiplying the percent of the trucks load (ITRUCK(N,6)) by the quantities in the IMIX array for the particular mix the truck is carrying (ITRUCK(N,5)).

(2) After completion of the reload, the truck is scheduled to return to the combat trains or assembly area. If the truck is empty it will return through a UNTDEP (unit departure) to the ASP or ATP for another load (see paragraph 2d. below). Otherwise, the truck will wait at the unit for the next RELOAD event.

c. UNTARV (arrival of a unit truck at the unit). UNTARV brings the truck back to the unit combat trains (if it is a maneuver unit) or the assembly area (for an artillery unit). The ammunition-on-trucks attributes in the IUNIT array are incremented by the ammunition load of the returning truck. UNTARV may schedule a RELOAD event if there is an outstanding demand for the type of ammo on the returning truck.

d. UNTDEP (departure of a unit truck from the assembly area or combat trains). If upon completion of a RELOAD event the truck is empty, a unit departure is scheduled. This event checks for the most needed type at the unit. If that ammunition type is stocked at the ATP, an ATP arrival (ATPARV) event is scheduled. The arrival time is based upon the distance from the unit to the ATP and the average speed of the truck. If the needed ammunition type is not stocked at the ATP, then the arrival time to the ASP is calculated and an ASP arrival (ASPARV) event is scheduled.

e. ATPARV (arrival of a unit truck at the ATP). When the ATPARV event is executed, the ATPARV subroutine checks to see that the ammunition type required by the arriving truck is on-hand at the servicing ATP. If the needed ammunition type is available at this ATP, ATPARV looks in queue for a free server (a piece of Materiel Handing Equipment, MHE, i.e. a forklift or a crane), and a S&P with the proper ammunition mix. If either the server or the S&P is unavailable (busy or not present), the unit truck is placed in queue to wait for a free server. When both a server and an S&P with the proper mix are available, ATPARV schedules an ATP event to load the unit truck (the server and unit truck number are passed as IPARMS when the event is scheduled), and the S&P is put in queue. If the needed ammunition type is not available at this ATP, then the truck is bumped to the associated ASP by scheduling an ASPARV.

f. ATP (service of a unit truck at the ATP). The ATP event simulates the transloading of ammunition from an S&P to a unit truck. This is accomplished by decrementing the load on the S&P and incrementing the unit truck load, using the IMIX array (for number of rounds) and the ITRUCK array (ITRUCK 6 which is the percent loaded and ITRUCK 5 which is the mix on the vehicle). If the S&P runs out of ammunition before the unit truck is full, ATP looks for another S&P to finish loading the unit truck (if none are available, the unit truck goes through an ATPARV). The empty S&P goes through an ATPAR1 (on the way to the CSA) if it is a CSA-ATP truck. If the empty S&P belongs to the ASP, it is scheduled for an ATPAR2 (for an eventual reload). When the unit truck finishes loading, it is scheduled for a UNTARV to return it to the unit. The UNTARV routine is also used (in the ATP subroutine) to schedule the return of a server to the proper queue in the ATP.

g. ATPAR1 (arrival of a CSA-ATP S&P at the ATP).

(1) The major function of ATPAR1 is to accept S&Ps coming into the ATP. This includes full trucks coming from the CSA and empty (or partially empty) trucks returning to queue from reloading a unit truck in the ATP event.

(2) ATPAR1 also handles the redistribution function of the Division Ammunition Officer (DAO). S&P trucks arriving at the DAO from the CSA (IPARM(4) will be 333) are scheduled into the ATP that needs the ammunition the most (another ATPAR1). This represents the diversion of these trucks to where they are needed the most.

Empty trucks are sent to the CSA through a CSAARV. Partially loaded trucks are put in queue.

h. CSAARV (arrival of an empty S&P at the CSA). CSAARV increments the throughput at the CSA, and sets the load attribute of the S&P to a full load (ITRUCK(N,6)=10000). If the S&P is from an ASP, then CSAARV checks each ASP to find the ASP and ammunition type that is needed the most. A CSADEP event is scheduled to return the S&P to the ATP or ASP.

i. CSADEP (departure of a full S&P from the CSA). S&Ps travel from the CSA forward in convoys. CSA to ATP convoys contain three trucks; a CSA to ASP convoy is seven trucks. The S&Ps wait in queue until there are enough going to the same place to form a convoy. When a convoy is formed, trucks are dispached to arrive at their destination one minute apart. ASP convoys go through the ASPAR2 event. ATP convoys go to the DAO by scheduling an ATPAR1 with IPARM(4) set to 333 (see g above).

j. ATPAR2 (arrival of an ASP S&P truck at the ATP). ATPAR2 processes ASP S&P trucks at the ATP. Empty ATP-ASP S&P trucks are scheduled for an ASPAR1 to load from stocks at the ASP. Full S&P trucks returning from the ASP, as well as partially full S&P trucks (returning from loading unit trucks in the ATP), are placed in the S&P queue at the ATP, by this routine.

k. ASPAR1. ASPAR1 simulates the arrival of an ASP-ATP S&P truck at the ASP.

(1) The S&P tractor will exchange an empty trailer for a full one, if one of the right mix is available. Otherwise, ASPAR1 attempts to locate a server to load the empty trailer from the ground. If no servers are available, the tractor and empty trailer wait in queue for a returning server. If there is not sufficient ammunition available on trailers or on the ground, the S&P will be "bumped" to the rear ASP by scheduling another ASPAR1. In the case when there is no ammunition at the rear ASP, the S&P truck waits in queue.

(2) The filled truck returns to the ATP through an ATPAR2. The server is released by scheduling a UNTARV. If the ATP S&P switched trailers with a CSA S&P truck, the CSA truck is returned by scheduling an ASPAR2.

l. ASPARV (arrival of a unit truck at the ASP). ASPARV works much the same way as ATPARV, in that it sets up the unit truck for loading (at the ASP). ASPARV locates a server and schedules an ASP event to load the truck from the ground or a waiting S&P. If the needed type is out of stock at this ASP, then ASPCK will find another ASP that has the needed type. The truck must wait in queue if no ASP has the needed ammunition. MLRS trucks are self-loading and require no server. Only three MLRS may load at one time; additional MLRS must wait in queue.

m. ASP. The ASP event reloads a unit truck at the ASP. ASP will get an S&P from the queue if one is available, to load the unit truck. If the S&P runs out of ammunition, ASP schedules the return of the empty S&P truck (ASPAR2), and gets another from queue to service unit trucks needs. When no more S&Ps are available, ASP will load the unit truck from stocks on the ground.

n. ASPAR2. ASPAR2 handles ASP-CSA S&P trucks.

(1) Empty S&Ps are put into queue until seven are ready to be sent to the CSA in convoy. Trucks in a convoy are scheduled to arrive at the CSA (CSAARV) one minute apart.

(2) Full S&P trucks arriving from the CSA look for an empty ATP-ASP S&P waiting in queue for their ammunition type. If a match is found they will switch trailers, the ATP-ASP truck (full) returns to the ATP (ATPAR2). The ASP-CSA truck (empty) is scheduled through an ASPAR2 to go to the CSA. If no ATP trucks are waiting then ASPAR2 looks for a server, and puts the S&P in queue to be offloaded. If a server was found, ASPAR2 calls SERVER to offload the trucks in queue.

(3) Partially full S&Ps returning from loading unit trucks in the ASP event are scheduled for an ASPAR2 to be put in their proper queue.

o. HELARV (arrival of a helicopter (CH-47) at an artillery unit). When 155mm artillery units become critically short of ammunition, DEMAND will schedule a HELARV event. This subroutine increments the ammunition supply in the IUNIT array, and schedules a HASPAR that returns the helicopter to the ASP. It is assumed that the helicopter was idle and the cargo bags were preloaded at the ASP for the helicopter to pick up.

p. HASPAR (return of a helicopter to the ASP). HASPAR simulates the return of the helicopter to the available queue and its eventual reload in preparation for another aerial resupply. Subroutine SERVER is called to load the cargo bags of the helicopter at the ASP.

3. Special purpose routines.

a. OPERA.

(1) Each time a truck is scheduled to move (or for MHE, scheduled to be used), the routine scheduling this action calls subroutine OPERA to check the operational availability of that vehicle. Each vehicle has its own clock that keeps track of the vehicle's time to next failure (in minutes). Time to next failure is maintained (stored) in ITRUCK (N,7), and is exponentially distributed about the mean time to fail (MTTF) for the vehicle type.

(2) When a vehicle is scheduled to move from one location to another (or is in use for a period of time), the travel time is subtracted from the time to next failure. If the time to fail reaches zero, then the vehicle is delayed by a repair time, which is a random variable, log normally distributed about the mean time to repair (MTTR) for the given vehicle type.

b. INTRDK (vehicle interdiction).

(1) Whenever a subroutine schedules an event that causes a vehicle to move, it calls INTRDK to find out if the vehicle completes the move. The division area of operations is divided into two zones for interdiction purposes. Zone one extends from line of contact to the brigade rear boundary. Zone two is the area from the brigade rear boundary back to the corps storage area.

(2) The operator inputs parameters to the database in array INTER, which are derived from the scenario. For each zone, there is a maximum number of interdictions, a modulo number, and a counter which accumulates number of trucks who have travelled this CI (see array definition of INTER for more information). If the number of trucks traveling through the zone this CI is evenly divisible by the modulo for the zone (using modular arithmetic), then this truck will be killed. If a unit truck is interdicted, the time of interdiction is stored in the IUNIT array (IUNIT(N,6)) to evenly distribute the total interdictions for a CI over all units with trucks on the road.

c. DUALMX (reload mortars and 25 mm ammunition. Since mortar and 25 mm ammunition are carried on the same unit truck, and are fired at different rates, RELOAD cannot handle reloading these weapons. RELOAD calls DUALMX to reload mortars and 25 mm weapons. DUALMX finds which type has the greatest need, and loads both weapons to the same percentage of truck load. This is done so the percent load in the ITRUCK array will represent both ammunition types. As in RELOAD, partially loaded trucks are scheduled into a UNTARV. Empty trucks go through UNTDEP to the ASP.

d. LDPWDR (load powder on artillery truck at the ATP). LDPWDR is called by ATP to finish loading an artillery (unit) truck with powder and fuzes.

e. ASPCK (check alternate ASPs for ammo). ASPCK checks for the needed ammunition at the sister and rear ASPs, and schedules the unit truck into an ASPARV if ammo ia available. If ammunition is unavailable at alternate ASPs, the truck is kept at the current ASP and ASPCK returns a 777 in IPARM(4) to the calling routine.

f. DEPASP (departure of a MLRS truck from the ASP or ATP). Since only three MLRS trucks may load at any one time, DEPASP brings the next MLRS truck in when one finishes loading. This is accomplished by scheduling a false UNTARV event for the newly loaded unit truck (IPARM (2)=0 for ASP; -1 for ATP). An ATP or ASP event will be scheduled for the new truck.

g. SERVER (release of a server at the ATP or ASP). SERVER is called from UNTARV to process a server when it comes available. It looks for a unit truck in queue to load in an ATP or ASP event. At the ASP, SERVER may find a CSA S&P to offload or an ATP S&P to load. When there are no more trucks to be serviced, the server is put in queue.

```
a.      SUBROUTINE MAINARM
        CHARACTER*10 AUNIT
C
        INCLUDE LOG.LIST
        INCLUDE QUENUM,LIST
        INCLUDE QUEPNT,LIST
        INCLUDE AUNIT.LIST
        DIMENSION IPARM(5)
C**** MAIN,  H. JONES    DEC 78
C
C**** UNIT 2    REPORT FILE
C**** UNIT 3    INPUT  DATA, COMMONS LOG, QUENUM, QUEPNT
C**** UNIT 4    OUTPUT DATA, COMMONS LOG, QUENUM, QUEPNT
C**** UNIT 5    KEYBOARD
C**** UNIT 6    DISPLAY
C**** UNIT 7    INPUT  DATA, COMMON EVENTS
C**** UNIT 8    OUTPUT DATA, COMMON EVENTS
C**** UNIT 9    INPUT  DATA, DEMAND FILE
C**** UNIT 11   INPUT DATA, CONVOY EVENTS
C
C            DICTIONARY
C            ----------
C     DIST      The distance between two specified locations.  See TVLTIM.
C     IOWNER    The owner number of the vehicle; attribute(4) of the vehicle
C               in the ITRUCK array.
C     ITKTYP    The vehicle type; attribute(1) of the vehicle in the ITRUCK
C               array.
C     LOAD()    The number of rounds of the specified type loaded on the
C               vehicle.  see also ND().
C     MIX       The mix of ammuntion on vehicle; attribute(5) of the ITRUCK
C               array. For a given mix number, the number of rounds for
C               each ammuntion type is listed in the IMIX array.
C     MIXGET    The MIX of ammunition that an empty unit/trains truck is
C               being sent to get from either the ATP or the ASP.
C     NASP      The ASP number from the IASP array.  (1..6)
C     NATP      The ATP number from the IATP array.  (1..6)
C     ND()      The number of rounds of the specified ammunition type needed,
C               demanded, or required.  See also LOAD().
C     NRONTK    The total number of rounds on the vehicle.
C     NUMAM     Ammumition type; usually used in DO LOOP control.
C     NUMRD     The total number of rounds needed, demanded or required.
C     NUMSP     The S&P number from the ITRUCK array.
C     NUMSVR    The server number from the ITRUCK array.
C     NUMTK     The truck number from the ITRUCK array.
C     NUNIT     The unit number from the IUNIT array for either units or
C               battalions.
C     TDELA     The time delay for vehicle (or server) providing ammunition.
C     TFAIL     The duration of maintenance failure for a vehicle.
C     TGNDLD    The time to load truck recieving ammunition from stocks on
C               the ground.
C     TLOAD     The time to load vehicle recieving ammuntion.
C     TMIND     The duration of non-availability due to enemy interdiction.
C     TOFFLD    The time to off-load ammunition to the ground from a truck.
C     TOTIM     The sum of all loading or delay times.
```

```
C
C**** INITIALIZE SIMULATION
      CALL INIT
C
C**** GET AND PROCESS EACH EVENT
    5 CALL NEXTEV (KIND, IPARM, TIME)
      IF(KIND .LT. 1  .OR. KIND .GT. 19) WRITE(6,7) KIND
    7 FORMAT(' EVENT TYPE ',I5,' OUT OF RANGE')
      CALL LOOKEV (KIND+0, IPARM, TIME+0., 1)
      GO TO (10,20,30,40,50,60,70,80,90,100,110,120,130,140,
     Z   150,160,170,180,190), KIND
C
C**** CHECKS AMMO DEMAND OF UNIT
   10 CALL DEMAND (IPARM)
      GO TO 5
C
C**** REPLACES ROUNDS OF AMMO AT UNIT WEAPONS
   20 CALL RELOAD (IPARM)
      GO TO 5
C
C**** DEPARTURE OF TRUCK FROM UNIT
   30 CALL UNTDEP (IPARM)
      GO TO 5
C
C**** ARRIVAL OF UNIT TRUCK AT ATP
   40 CALL ATPARV (IPARM)
      GO TO 5
C
C**** ARRIVAL OF UNIT TRUCK AT ASP
   50 CALL ASPARV (IPARM)
      GO TO 5
C
C**** SERVICE OF UNIT TRUCK FROM QUEUE AT ATP
   60 CALL ATP (IPARM)
      GO TO 5
C
C**** SERVICE OF UNIT TRUCK FROM QUEUE AT ASP
   70 CALL ASP (IPARM)
      GO TO 5
C
C**** ARRIVAL OF TRUCK AT UNIT
   80 CALL UNTARV (IPARM)
      GO TO 5
C
C**** ARRIVAL OF TRUCK AT CSA   (FROM ATP OR ASP)
   90 CALL CSAARV (IPARM)
      GO TO 5
C
C**** ARRIVAL OF ATP S & P FROM CSA
  100 CALL ATPAR1 (IPARM)
      GO TO 5
C
C**** ARRIVAL OF ASP S & P AT ATP
  110 CALL ATPAR2 (IPARM)
```

```
C
C**** ARRIVAL OF ASP S & P AT ASP   (FROM ATP)
  120 CALL ASPAR1 (IPARM)
      GO TO 5
C
C**** ARRIVAL OF CSA S & P AT ASP
  130 CALL ASPAR2 (IPARM)
      GO TO 5
C
C**** ARRIVAL OF HELICOPTER AT UNIT
  140 CALL HELARV (IPARM)
      GO TO 5
C
C**** ARRIVAL OF HELICOPTER AT ASP
  150 CALL HASPAR (IPARM)
      GO TO 5
C
C**** DEPARTURE OF S & P FROM CSA
  160 CALL CSADEP (IPARM)
      GO TO 5
C
C**** REPORT
  170 CALL REPORT (IPARM)
      GO TO 5
C
C**** INTERACTIVE CONTROL (MENU)
  180 CALL CONTRL (TIME)
      GO TO 5
C
C**** SIMULATION END
  190 CALL ENDSIM(IPARM)
      CALL EVSTOP
      STOP
      END
```

b.   SUBROUTINE ASP

```
      SUBROUTINE ASP (IPARM)
C**** EVENT ASP -- SERVICE OF TRUCK FROM QUEUE AT ASP.
C                  MAY LOAD UNIT TRUCK FROM A S&P OR GROUND.
C                  ALL EXCEPT MLRS NEED SERVERS.
C     EVENT TYPE 7
C     CALLED BY MAINARM
C     CALLS IQ, FINTK, SCHED, OPERA, INTRDK
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) --   1 = ROUTINE QUEUE,   2 = MLRS QUEUE
C**** IPARM(2) --   ASP NUMBER
C**** IPARM(3) --   UNIT TRUCK NUMBER
C**** IPARM(4) --   SERVER NUMBER (FOR MLRS, SAME AS TRUCK)
C
C**** SCHEDULES   --  UNTARV, ARRIVAL OF TRUCK AT UNIT
C                             OR SERVER
C                     ASPAR2, RELEASE OF S&P
C                     ASPARV, INTERDICTED UNIT TRUCK
C
C**** SCHEDULED BY    ASPARV, DEPASP, SERVER
C
C**** (2) CALCULATES LOAD TIME AS FUNCTION OF LOAD MIX
C****     NUMBER AND NUMBER OF SERVERS ACTIVE FOR THIS QUEUE.
C
C**** NOTE !!! IN THIS ROUTINE ITRUCK(X,3) CONTAINS THE TIME THE
C**** THAT TRUCK NUMTK ARRIVED AT THE ASP !!!
C**** CHECKS  --  DELAY DUE TO MTBF AND INTERDICTION.
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5),IIPARM(5)
C     LOCAL VARIABLE DEFINITION
C     NASPQ - QUEUE NUMBER TO BE SERVICED
C     NUMTK -TRUCK TO BE SERVED
C     NUMSP - S&P TRK FROM CSA TO ASP
C     MIX -AMMO MIX INDEX ON UNIT TRUCKS
C     MIXSP - MIX ON CSA TRUCK
C     NRONTK - NO. OF ROUNDS ON CSA TRUCK
C     TLOAD - TIME FOR A SERVER TO LOAD ONE TRUCK
C     ITKTYP - TYPE OF TRUCK TO BE SERVED
C     NUNIT - UNIT NUMBER OWNING THE TRUCK
C     DIST - DISTANCE BETWEEN ASP AND UNIT OR CSA AND ASP
C     TVLTIM - TRAVEL TIME
C     TFAIL - TIME LOST DUE TO FAILURE
C     TMIND - TIME LOST DUE TO INTERDICTION
C     TOTIM -TIME OF SCHEDULED EVENT
C
      IQTYPE = IPARM(1)
      NASP = IPARM(2) - 10
      NUMTK = IPARM(3)
      NUMSRV = IPARM(4)
      IPARM(3) = 0
      IPARM(4) = 0
      TLOAD = 0.
      IFLAG = 0
      NFLAG = 0
C
C     FIND THE VALUE FOR THE QUEUE: 1 FOR ROUTINE, 4 FOR MLRS
      KVAL = 1
      IF(IQTYPE .EQ. 2) KVAL = 4
C     FIND THE QUEUE WAIT TIME AND ADD IT TO TOTAL QUEUE TIME
      NTQUE = TIME - ITRUCK(NUMTK,3)
      ITRUCK(NUMTK,12) = ITRUCK(NUMTK,12) + NTQUE
      JASP(NASP,KVAL+1) = JASP(NASP,KVAL+1) + NTQUE
C     IF THIS IS THE LONGEST QUEUE WAIT RECORD IT
      IF(NTQUE.GT.JASP(NASP,KVAL+2)) JASP(NASP,KVAL+2)=NTQUE
C     ADD ONE TO THE NUMBER SERVED
      JASP(NASP,KVAL) = JASP(NASP,KVAL) + 1
C
      MIX = ITRUCK(NUMTK,5)
C**** FIND AMMO TYPE WANTED. ASSUME ONLY ONE TYPF.
      DO 30 NUMAM = 1,LPPAR(1)
      IF(IMIX(MIX,NUMAM) .LE. 0)GO TO 30
C**** RECORD NUMBER OF ROUNDS NEEDED -NRNDSN AND TYPE OF RDS
      NRNDSN = IMIX(MIX,NUMAM)
C**** CHECK IF THERE IS AMMO ON CSA TRUCKS
      NASPQ = IQ(7,NASP)
   50 CALL FINTK(NASPQ,NUMAM,NUMSP,0)
C     IF NO TRUCK, GO TO GROUND LD UP
      IF(NUMSP .EQ. 0) GO TO 70
C     FIND THE NUMBER OF ROUNDS ON NUMSP.  IF SUFFICIENT, DECREMENT
C     AMMO, SCHEDULE UNTARV, PUT TRUCK BACK IN ASP Q.
C     IF INSUFFICIENT, EMPTY S&P TRUCK,SEND TO CSA, DECREMENT
C     THE NUMBER OF ROUNDS REQUIRED, FIND ANOTHER TRUCK WITH
C     PROPER AMMO OR COMPLETE LOADING FROM STOCK.
C     UPDATE PER CENT ROUNDS ON THE TRUCK.
      MIXSP = ITRUCK(NUMSP,5)
      NRONTK = (IMIX(MIXSP,NUMAM)*ITRUCK(NUMSP,6)+9999)/10000
      ITRUCK(NUMSRV,13) = ITRUCK(NUMSRV,13) + 1 @ LOAD FROM CSA S&P
C     IF INSUFFICIENT ROUNDS GO TO 60
      IF(NRNDSN .GT. NRONTK) GO TO 60
C     SUFFICIENT AMMO ON TRUCK, DECREMENT AMMO ON TRUCK
      ITRUCK(NUMSP,6) = 10000*(NRONTK - NRNDSN)/IMIX(MIXSP,NUMAM)
      IF(ITRUCK(NUMSP,6) .EQ. 0) GO TO 60
      IF(IFLAG .EQ. 1)THEN
         RNDS = NRNDSN
         RNDAV = FRNN
         TDELAY = TDELAY + IMIX(MIX,32) * (RNDS/RNDAV)
      ELSE
         TDELAY = IMIX(MIX,32)
      END IF
C      SCHEDULE RELEASE OF S & P
      IIPARM(1) = NASP + 10
      IIPARM(2) = NUMSP
      IIPARM(3) = 0
      IIPARM(4) = 999
      CALL SCHED(13,IIPARM,TIME + TDELAY)       @ ASPAR2
```

```
C       INSUFFICIENT AMMO OR EXACTLY ENOUGH AMMO ON S&P
C       TIME TO SHIFT PARTIAL LOAD
   60   FRNN= NRNDSN
        TLOAD = IMIX(MIX,32) * NRONTK / FRNN
        IF (IDAY .EQ. 0) TLOAD = 1.54*TLOAD
        TDELAY = TDELAY + TLOAD   + 5.0
        NRNDSN = NRNDSN - NRONTK
        ITRUCK(NUMSP,6) = 0
        IIPARM(1) = NASP + 10
        IIPARM(2) = NUMSP
        IIPARM(3) = 0
        IIPARM(4) = 555
        CALL SCHED(13,IIPARM,TIME + TDELAY)      @ ASPAR2
        IFLAG = 1
C       IF EXACTLY ENOUGH ROUNDS ON TRUCK, SEND BACK TO UNIT
        IF(NRNDSN .EQ. 0) GO TO 80
C       GO GET ANOTHER S&P TRUCK TO COMPLETE THE LOAD
C       OR COMPLETE FROM ON THE GROUND STOCK
        GO TO 50
   70   NRST = NRNDSN
        TTLOAD = TLOAD + (IMIX(MIX,32))*(NRST / IMIX(MIX,NUMAM))
        IF (IDAY .EQ. 0) TTLOAD = 1.54*TTLOAD
        TDELAY = TDELAY + TTLOAD
C**** DECREMENT AMMO AVAILABLE
   80   CONTINUE
        IASP(NASP,NUMAM*3+18) = IASP(NASP,NUMAM*3+18) - IMIX(MIX,NUMAM)
        IF(IASP(NASP,NUMAM*3+18).LT. 0)PRINT*,INT(TIME),' NO AMMO',NUMAM,
      $      ' AT ASP',NASP
        IASPAM(NASP,MIX) = IASPAM(NASP,MIX) +  1 @ INCR # TRUCKS SERVICED
C * * * DECREMENT 'DEMAND'
        IASP(NASP,NUMAM*3+19) = IASP(NASP,NUMAM*3+19) - IMIX(MIX,NUMAM)
C**** IF ARTY AMMO DECREMENT POWDER AND FUZES
        IF(NUMAM .GT. 3 .AND. NUMAM .LT. 6 .OR. NUMAM .GT. 10 .AND. NUMAM
      Z  .LT. 14)THEN
           IASP(NASP,27) = IASP(NASP,27) - IMIX(MIX,NUMAM)
           IASP(NASP,78) = IASP(NASP,78) - IMIX(MIX,NUMAM)
        END IF
        IF(NUMAM .GT.5 .AND. NUMAM .LT. 8 .OR. NUMAM .EQ. 15)THEN
           IASP(NASP,42) = IASP(NASP,42) - IMIX(MIX,NUMAM)
           IASP(NASP,78) = IASP(NASP,78) - IMIX(MIX,NUMAM)
        END IF
   90   CONTINUE
C * * * DECREMENT  NUMBER TRUCK IN QUEUE
        IF(NFLAG .EQ. 1) GO TO 100
        IASP(NASP,IQTYPE+11) = IASP(NASP,IQTYPE+11) - 1
        IF(IASP(NASP,IQTYPE+11) .LT. 0)PRINT*,INT(TIME),'QUE',NASP+10,
      Z  IASP(NASP,IQTYPE+11),' IN THE ASP'
C       FIND TYPE OF TRUCK AND COMPUTE TRAVEL TIME
        ITKTYP = ITRUCK(NUMTK,1)
        NUNIT = ITRUCK(NUMTK,4)
        DIST = IUNIT(NUNIT,5)
        IF(((NASP + 10) - IUNIT(NUNIT,3)) .EQ. 1 .OR. ((NASP + 10)
      Z - IUNIT(NUNIT,3)) .EQ. -1)DIST = DIST + 15.
        IF(((NASP + 10) - IUNIT(NUNIT,3)) .EQ. 2)DIST = DIST +
      TVLTIM = 60. * DIST / ITYPE(ITKTYP,IDAY+1)
      ITRUCK(NUMTK,3) = 4
      CALL INTRDK(NUMTK,TMIND)
      IF(TMIND .LE. 0.) THEN
         CALL OPERA(NUMTK,TVLTIM,TFAIL)
      ELSE
         TFAIL = 0.
      END IF
      TOTIM = TIME + TDELAY
C     SCHEDULE UNTARV
      IPARM(1) = NUNIT
      IPARM(2) = NUMTK
      TOTIM = TIME + TDELAY + TMIND + TFAIL + TVLTIM
C     IF NO INTERDICTION, BYPASS.
      IF(TMIND .LE. 0)GO TO 100
      TOTIM=TOTIM + TDELAY
      NFLAG = 1            @ TO CHARGE 2D LOAD OF AMMO
      GO TO 80
  100 CONTINUE
C     ADD ONE TO THE NUMBER OF TRUCKS TRAVELING FROM ASP TO UNIT
      ITKTYP = IUNIT(NUNIT,1)
      JUNIT(ITKTYP,17) = JUNIT(ITKTYP,17) + 1
C     ADD TO THE NUMBER OF KILLED OR FAILED ON THIS TRIP
      IF(TMIND .GT. 0) JUNIT(ITKTYP,18) = JUNIT(ITKTYP,18) + 1
      IF(TFAIL .GT. 0) JUNIT(ITKTYP,19) = JUNIT(ITKTYP,19) + 1
C     ADD THE WAIT AND LOAD AND TRAVEL TIME TO THE TOTAL TIME
      JUNIT(ITKTYP,20) = JUNIT(ITKTYP,20) + NTQUE + TTLOAD + TVLTIM
C
      IF(TMIND .GT. 0)THEN
         IPARM(3) = IUNIT(NUNIT,3)
         CALL SCHED(5,IPARM,TMIND + TIME)      @ ASPARV
         ITRUCK(NUMTK,6) = 0
      ELSE
         CALL SCHED(8,IPARM,TOTIM)             @ UNTARV
         ITRUCK(NUMTK,6) = 10000
      END IF
      IF(KVAL .EQ. 1) THEN
C****    SCHEDULE THE AVAILABILITY OF THE SERVER
C
         CALL OPERA(NUMSRV,TDELAY,TTFAIL)
         DTIME = TIME + TDELAY + TTFAIL
         IPARM(1) = NASP + 10
         IPARM(2) = NUMSRV
         IPARM(3) = 1
         CALL SCHED(8,IPARM,DTIME)             @ UNTARV
         ITRUCK(NUMSRV,6) = ITRUCK(NUMSRV,6) + TDELAY
         IF(ITRUCK(NUMTK,1) .EQ. 1)THEN
            ITRUCK(NUMSRV,12) = ITRUCK(NUMSRV,12) + 1 @ 10TON COUNTER
         ELSE
            ITRUCK(NUMSRV,11) = ITRUCK(NUMSRV,11) + 1 @ 5TON COUNTER
         END IF
       ELSE
C
C****     SCHEDULE THE DEPARTURE OF THE MLRS TRUCK, THIS ALLOWS
```

```
          DTIME = TIME + TDELAY
          IPARM(1) = NASP + 10
          IPARM(2) = 0
          IPARM(3) = 0
          CALL SCHED (8,IPARM,DTIME)           @ UNTARV
      END IF
      RETURN
      END
```

c. SUBROUTINE ASPARV

```
      SUBROUTINE ASPARV (IPARM)
C**** EVENT ASPARV -- ARRIVAL OF UNIT TRUCK AT ASP
C                          FIND A SERVER, S&P --> SCHED ASP
C          EVENT TYPE 5
C
C     CALLED BY MAINARM
C     CALLS SCHED, IQ, ASPCK, GETQUE, PUTQUE
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASP NUMBER
C**** IPARM(4) -- MIX ON TRUCK COMING INTO PROGRAM
C**** THIS EVENT PUTS TRUCK IN PROPER ASP QUEUE.
C
C     SCHEDULES  -- ASP SERVICE OF UNIT TRUCK FROM QUEUE AT ASP
C                   (IF ASP SERVICE FOR THIS QUEUE IS IDLE)
C                   ASPARV, (ITSELF) AS A FALSE EVENT
C     SCHEDULED BY ASP, ASPARV, ASPCK, ATP, ATPARV, DUALMX, RELOAD, UNTDEP
C*******CHANGES----IPARM(4) TO SERVER NUMBER
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
C     LOCAL VARIABLES
C     MIX - THE INDEX OF THE AMMO TYPE FROM IMIX
C     NASPQ - QUEUE FOR TRUCK
C     NUMQ  - SERVER QUEUE
C     IND - INDEX TO COUNT TRUCKS QUEUE
C     NASP - ASP NUMBER
C
      NUNIT = IPARM(1)
      NUMTK = IPARM(2)
      NASP = IPARM(3) - 10
      IPARM(4) = 0
C
C     DETERMINE AMMO MIX INDEX.
      MIX = ITRUCK(NUMTK,5)
C *** IF UNIT TRUCK ENTERING ASPARV IS FROM INTERDICTION OR BREAK-
C     DOWN AND ASP # HAS CHANGED, SCHED ASPARV 30 MIN LATER.
      IF(ITRUCK(NUMTK,2) .NE. 9)THEN @ IF EQ., OLD ASP INT'D; SKIP
         IOWNER = ITRUCK(NUMTK,4)
         LASP  = IUNIT(IOWNER,3)
         IF(NASP + 10 .NE. LASP)THEN
            IPARM(3) = LASP
            IPARM(4) = MIX
            CALL SCHED(5,IPARM,TIME + 30.)      @ ASPARV
            RETURN
         END IF
      END IF
C     ASSUME NO MLRS IN MIX
      NASPQ = IQ(8,NASP)
      IND = 12
```

```
C ****  IF TRUCK WAS INTERDICTED, ADD AMMO TO UNIT ROUNDS DUE IN
      IF(ITRUCK(NUMTK,3) .EQ. 7)THEN
         DO 1 I = 1,LPPAR(6)
         NAM = I * 13 - 5
         IF(IUNIT(IPARM(1),NAM) .GT. 0) THEN
            IUNIT(NUNIT,NAM+12) = IUNIT(NUNIT,NAM+12) +
     2      IMIX(MIX,IUNIT(NUNIT,NAM))
         END IF
  1      CONTINUE
      END IF
C * * * DETERMINE AMMO TYPE
      NUMAM = MIX
      IF(MIX .GT. LPPAR(7))NUMAM = MIX - LPPAR(7)
C
C * * IF .EQ. 9, TRUCK ARRIVED FROM ANOTHER ASP
      IF(ITRUCK(NUMTK,2) .EQ. 9)IASP(NASP,NUMAM * 3 + 19) =
     $  IASP(NASP,NUMAM * 3 + 19) - IMIX(MIX,NUMAM)
C
C * * * DETERMINE IF SUFFICIENT AMMO ON HAND (IF 'ON HAND' - 'DEMAND'
C        < 'NEEDED')
      IF(IASP(NASP,NUMAM*3+18) - IASP(NASP,NUMAM*3+19) .LT.
     $  IMIX(MIX,NUMAM))THEN
         IF(ITRUCK(NUMTK,2) .EQ. 9)GO TO 10
         CALL ASPCK(IPARM)
         IF(IPARM(4) .NE. 777)RETURN
      ELSE
         ITRUCK(NUMTK,2) = 1
      END IF
C     SET ITRUCK(N,3) EQUAL TO THE TIME OF QUEUE ENTRY, THIS
C     WILL ALLOW QUEUE WAIT TIME TO BE FOUND FOR THE TRUCK
   10 ITRUCK(NUMTK,3) = TIME
C     INCREMENT NUMBER OF TRUCKS IN QUEUE
      IASP(NASP,IND) = IASP(NASP,IND) +1
C * * * INCREMENT 'DEMAND'
      DO 20 IAM = 1,LPPAR(1)
      IASP(NASP,IAM*3+19) = IASP(NASP,IAM*3+19) + IMIX(MIX,IAM)
  20  CONTINUE
C * * * IF EQ 9,THIS IS SECOND ASP AND NO AMMO -- PUT IN QUEUE
      IF(ITRUCK(NUMTK,2) .EQ. 9)GO TO 5
C * * * IF EQ 777, NOT ENOUGH AMMO AT ANY ASPS -- PUT IN QUEUE
      IF(IPARM(4) .EQ. 777)GO TO 5
C * * FIND AMMO TYPE NEEDED
C**** IF MLRS SCHEDULE THE ASP EVENT
C     IF THERE ARE LESS THAN 3 TRUCKS ALREADY LOADING
      IF(NUMAM .EQ. 10)THEN
         IF(IASP(NASP,8) .LE. 3) THEN
            IASP(NASP,8) = IASP(NASP,8) + 1
            IPARM(1) = 2
            IPARM(2) = NASP + 10
            IPARM(3) = NUMTK
            IPARM(4) = NUMTK
            CALL SCHED(7,IPARM,TIME)            @ ASP
            RETURN
         ELSE
```

```
            GO TO 5
         ENDIF
      ENDIF
C**** LOOK FOR A SERVER AT THE ASP
      NUMQ = IASP(NASP,7)
      CALL GETQUE(NUMSRV,NUMQ)
      IF(NUMSRV .GT. 0) THEN
C****     SCHEDULE THE ASP EVENT
         IPARM(1) = 1
         IPARM(2) = NASP + 10
         IPARM(3) = NUMTK
         IPARM(4) = NUMSRV
         ITRUCK(NUMSRV,3) = 4
         CALL SCHED(7,IPARM,TIME)                 @ ASP
         RETURN
      ELSE
         IASP(NASP,20) = IASP(NASP,20) + 1      @ 'NO SERVER' CNTR
      END IF
C     PUT TRUCK INTO PROPER QUEUE
    5 CALL PUTQUE(NUMTK,NASPQ)
      RETURN
      END
```

d.   SUBROUTINE ASPCK

```
      SUBROUTINE ASPCK (IPARM)
C**** ASPCK -- CHECKS FOR SUFFICIENT AMMO AT ALTERNATE ASPS (TO BUMP TO)
C     CALLED BY ASPARV
C     CALLS SCHED, OPERA
C
C**** L TOLIN     MAY 82
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASP NUMBER
C**** IPARM(4) -- MIX ON TRUCK COMING IN (RETNS 777 IF NO ASP HAS AMMO)
C
C     SCHEDULES  -- ASPARV
C                   UNIT TRUCK TO SISTER OR REAR ASP IF PARENT ASP
C                   HAS INSUFFICIENT AMMO - KEEPS UNIT TRUCK AT
C                   PARENT ASP  IF INSUFFICIENT AMMO AT
C                   SISTER OR REAR ASPS
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
      INTEGER ONHAND,DEMAND
C
C     LOCAL VARIABLES
C     MIX - THE INDEX OF THE AMMO TYPE FROM IMIX
C     KVAL - FLAG  1= ROUTINE,  4= MLRS QUEUE
C     NASP - ASP NUMBER
C
C     DETERMINE AMMO MIX INDEX.
      NASP = IPARM(3) - 10
      MIX = ITRUCK(IPARM(2),5)
C *** DETERMINE AMMO TYPE (NUMAM) FOR ASP ARRAY
      NUMAM = MIX
      IF(MIX .GT. LPPAR(7))NUMAM = MIX - LPPAR(7)
      ONHAND = NUMAM*3+18
      DEMAND = NUMAM*3+19
      NRDSND = IMIX(MIX,NUMAM)
      NUMTK = IPARM(2)
C **  DETERMINE 'SISTER' ASP NUMBER(NSASP)
       J = NASP/2
      JJ = J * 2
      IF(NASP .EQ. JJ)THEN
         NSASP = NASP -1
      ELSE
         NSASP = NASP + 1
      END IF
C **  IF SISTER ASP HAS BEEN INTERDICTED, CHECK REAR ASP
C **  DETERMINE IF 'SISTER' ASP HAS SUFFICIENT AMMO
      IF(IASP(NSASP,ONHAND) - IASP(NSASP,DEMAND) .GE.
     $  NRDSND .AND. NASP+10 .NE. ISERV(6))THEN
         IASP(NSASP,DEMAND) = IASP(NSASP,DEMAND) + IMIX(MIX,NUMAM)
         IPARM(3) = NSASP + 10
         DDLAY = 90. - IDAY * 30.
         CALL OPERA(NUMTK,DDLAY,TFAIL)
         CALL SCHED(5,IPARM,DDTIME)              @ ASPARV
C        FIND THE VALUE FOR THE QUEUE:  1 FOR ROUTINE, 4 FOR MLRS
         KVAL = 1
         IF(NUMAM .EQ. 10)KVAL = 4
C        FIND THE QUEUE WAIT TIME AND ADD IT TO TOTAL QUEUE TIME
         NTQUE = TIME - ITRUCK(NUMTK,3)
         JASP(NSASP,KVAL+1) = JASP(NSASP,KVAL+1) + NTQUE
C        IF THIS IS THE LONGEST QUEUE WAIT, RECORD IT
         IF(NTQUE.GT.JASP(NSASP,KVAL+2))JASP(NSASP,KVAL+2)=NTQUE
         ITRUCK(NUMTK,2) = 9
         ITRUCK(NUMTK,3) = 9
         ITRUCK(NUMTK,13) = ITRUCK(NUMTK,13) + 1 @ BUMP COUNTER TO RASP
         WRITE(6,100)NUMTK,MIX,NASP + 10,NSASP + 10,TIME
 100     FORMAT(' UNIT TRUCK',I4,' MIX',I3,' SENT FROM ASP',I3,
     Z      ' TO SISTER ASP',I3,' AT TIME',F8.1)
      ELSE
C **  DETERMINE 'REAR' ASP NUMBER(NRASP)
         NRASP = IASP(NASP,11) - 10
         IF (IASP(NASP,2) .EQ. 0 .AND. NRASP .GT. 0) THEN
            IASP(NRASP,DEMAND) = IASP(NRASP,DEMAND) + IMIX(MIX,NUMAM)
            IPARM(3) = NRASP + 10
            DIST = IASP(NASP,1) - IASP(NRASP,1)
            ITKTYP = ITRUCK(NUMTK,1)
            TVLTIM = 60. * DIST/ITYPE(ITKTYP,IDAY + 1)
            CALL OPERA(NUMTK,TVLTIM,TFAIL)
            TOTIM = TIME + TVLTIM + TFAIL
            CALL SCHED(5,IPARM,TOTIM)            @ ASPARV
C           FIND THE VALUE FOR THE QUEUE:  1 FOR ROUTINE, 4 FOR MLRS
            KVAL = 1
            IF(NUMAM .EQ. 10)KVAL = 4
C           FIND THE QUEUE WAIT TIME AND ADD IT TO TOTAL QUEUE TIME
            NTQUE = TIME - ITRUCK(NUMTK,3)
            JASP(NRASP,KVAL+1) = JASP(NRASP,KVAL+1) + NTQUE
C           IF THIS IS THE LONGEST QUEUE WAIT, RECORD IT
            IF(NTQUE.GT.JASP(NRASP,KVAL+2))JASP(NRASP,KVAL+2)=NTQUE
            ITRUCK(NUMTK,2) = 9
            ITRUCK(NUMTK,3) = 9
            ITRUCK(NUMTK,13) = ITRUCK(NUMTK,13) + 1 @ BUMP CNTR TO RASP
            WRITE(6,400)NUMTK,MIX,NASP + 10,NRASP + 10,TIME
 400        FORMAT(' UNIT TRUCK',I4,' MIX',I3,' SENT FROM ASP',I3,
     Z      ' TO REAR ASP',I3,' AT TIME',F8.1)
         ELSE
C **  NO AMMO OF NUMAM  RETURN
            ITRUCK(NUMTK,3) = TIME
            IPARM(4) = 777
            WRITE(6,500)NUMTK,MIX,NASP + 10,TIME
 500        FORMAT(' UNIT TRUCK',I4,' MIX',I3,' HELD AT ASP',I3,
     Z   ' AT TIME',F8.1)
         END IF
      END IF
      RETURN
      END
```

e. SUBROUTINE ASPAR1

```
      SUBROUTINE ASPAR1 (IPARM)
C**** EVENT ASPAR1 -- ARRIVAL OF ASP-ATP S&P AT ASP  (FROM ATP)
C                     TRUCK IS SERVICED(MAY PICKUP FULL TRAIL) AND
C                     RETURNED TO ATP.
C     EVENT TYPE 12
C     CALLED BY MAINARM
C     CALLS IQ, PUTQUE, OPERA, SCHED, FINTK, GETQUE, INTRDK
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- ATP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASP NUMBER
C**** IPARM(4) -- DIST FROM REAR ASP TO ATP
C
C     SCHEDULES     ASPAR1(ITSELF)
C                   ASPAR2, EMPTY CSA S&P BACK
C                   ATPAR2, ATP S&P BACK
C                   UNTARV, SERVER RETURN
C     SCHEDULED BY  ASPAR1, ATPAR2, SERVER
C**** CHECKS     -- DELAY DUE TO MTBF AND INTERDICTION
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5),IIPARM(5)
      INTEGER ONHAND,DEMAND,ONWAY,AVAIL
      DO 1 I = 1,5
         IIPARM(I) = 0
  1   CONTINUE
C**** LOCAL VARIABLES DEFINITION
C     MIX - AMMO ON TRUCK INDEX TO IMIX
C     NUMAM - AMMO TYPE
C     TVLTIM - TRAVEL TIME TO ATP
C     ITKTYP - TRUCK TYPE
C     TFAIL - TIME LOST DUE TO TRUCK FAILURE
C     TMIND -TIME LOST DUE TO INTERDICTION
C     TMLD - TIME TO LOAD AMMO AT ASP
C     TOTIM  - TIME OF ARRIVAL AT REAR ASP
C     TOTTIM - TIME OF ARRIVAL AT  ATP
C     HITI   - HITCH TIME
C
      NATP = IPARM(1)
      NUMSP = IPARM(2)
      NASP = IPARM(3) - 10
      RDIST = IPARM(4)                     @ .GT. 0 IF FROM FORWARD ASP
C
      IFLAG = 0
      NEGSVR = 0
      TDELAY = 0.
      TLOAD = 0.
      HITI = 0.          @ UNHITCH/HITCH TIME
C     FIND AMMO MIX INDEX ON THE TRUCK - MIX
      MIX = ITRUCK(NUMSP,5)
C * * * DETERMINE AMMO TYPE(NUMAM)
```

```
      NRDSND = IMIX(MIX,NUMAM)
C           SET ITRUCK(N,3) EQUAL TO THE TIME OF QUEUE ENTRY, THIS
C           ALLOW QUEUE WAIT TIME TO BE FOUND FOR THE TRUCK
         ITRUCK(NUMSP,3) = TIME
C * * * CHECK FOR SUFFICIENT AMMUNITION
      ONHAND = NUMAM * 3 + 18
      DEMAND = NUMAM * 3 + 19
      ONWAY = NUMAM * 3 + 20
      AVAIL = IASP(NASP,ONHAND) - IASP(NASP,DEMAND)
      IF(AVAIL .LT. NRDSND)THEN
         KRASP = IASP(NASP,11) - 10   @ REAR ASP #
         IF(IASP(KRASP,ONHAND) - IASP(KRASP,DEMAND) +
     $  IASP(KRASP,ONWAY) .LT. NRDSND)THEN
            CALL PUTQUE(NUMSP,IQ(11,NASP))
            IASP(NASP,DEMAND) = IASP(NASP,DEMAND) + NRDSND
            WRITE(6,25)NUMSP,MIX,NASP+10,TIME
  25        FORMAT(' ATP S&P',I5,' MIX',I3,' KEPT AT ASP',I3,
     $      ' AT TIME',F8.1)
            RETURN
         END IF
C        * * *  SCHEDULE ASPAR1 TO REAR ASP
         IPARM(3) = KRASP + 10
         ITRUCK(NUMSP,3) = 5
         DIST = IASP(NASP,1) - IASP(KRASP,1)
         ITKTYP = ITRUCK(NUMSP,1)
         TVLTIM = 60. * DIST / ITYPE(ITKTYP,IDAY+3)
         CALL OPERA(NUMSP,TVLTIM,TFAIL)
         TOTIM = TIME + TVLTIM + TFAIL
         IPARM(4) = DIST + IATP(NATP,2)
         CALL SCHED(12,IPARM,TOTIM)             @ ASPAR1
         ITRUCK(NUMSP,14) = ITRUCK(NUMSP,14) + 1   @ INCREMENT # BUMPS TO RASP
         WRITE(6,35)NUMSP,MIX,NASP+10,KRASP+10,TIME
  35     FORMAT(' ATP S&P',I5,' MIX',I3,' BUMPED FROM ASP',I3,
     $      ' TO REAR ASP',I3,' AT TIME',F8.1)
         RETURN
      END IF
C
C * * * SEARCH FOR FULL S & P
      NASPQ = IQ(7,NASP)
      CALL FINTK(NASPQ,MIX,NCSASP,1)
      IF(NCSASP .EQ. 0)GO TO 40
C * IF .GE.,HAVE FOUND FULL CSA S & P--ASSUME SWAP IN 30 MIN
      IF (ITRUCK(NCSASP,6) .GE. 10000)THEN
         ITRUCK(NCSASP,6) = 0
         IIPARM(1) = NASP + 10
         IIPARM(2) = NCSASP
         IIPARM(3) = 0
         IIPARM(4) = 555
         CALL SCHED(13,IIPARM,TIME + 30.)      @ ASPAR2
C * NOW SCHED ASP-ATP S & P TO ATP
         HITI = 30.
         ITRUCK(NUMSP,11) = ITRUCK(NUMSP,11) + 1 @ INCREMENT THRUPUT
         NEGSVR = 1
         GO TO 80
```

```
C * IF PARTIAL OR NO LOAD ON CSA S & P, TRY TO FIND SERVER
  40     NSVRQ = IASP(NASP,7)
         CALL GETQUE(NUMSVR,NSVRQ)
         IF(NUMSVR .EQ. 0)THEN                    @ NO SERVER -> QUEUE
            IF(NCSASP .NE. 0)CALL PUTQUE(NCSASP,NASPQ)
            CALL PUTQUE(NUMSP,IQ(11,NASP))
            RETURN
         ELSE
            JASP(NASP,7) = JASP(NASP,7) + 1    @ INCREMENT # SERVED
            ITRUCK(NUMSVR,3) = 4
         IF(NCSASP .EQ. 0)GO TO 70
            GO TO 55
         END IF
      END IF
C
C ** SERVER AVAILABLE--SEE IF ANOTHER S & P HAS AMMO TYPE NEEDED
  50  CALL FINTK(NASPQ,NUMAM,NCSASP,0)
C     IF NO TRUCK, GO TO GRND LOAD
      IF(NCSASP .EQ. 0) GO TO 70
C     FIND THE NUMBER OF ROUNDS ON NCSASP.  IF SUFFICIENT, DECREMENT
C     AMMO, SCHEDULE UNTARV, PUT TRUCK BACK IN ASP Q.
C     IF INSUFFICIENT, EMPTY S&P TRUCK,SEND TO CSA, DECREMENT
C     THE NUMBER OF ROUNDS REQUIRED, FIND ANOTHER TRUCK WITH
C     PROPER AMMO OR COMPLETE LOADING FROM STOCK.
C     UPDATE PER CENT ROUNDS ON THE TRUCK.
  55  NRONTK = (IMIX(MIX,NUMAM)*ITRUCK(NCSASP,6)+9999)/10000
      ITRUCK(NUMSVR,13) = ITRUCK(NUMSVR,13) + 1 @ LOAD FROM CSA S&P
C     IF INSUFFICIENT ROUNDS GO TO 60
      IF(NRDSND .GT. NRONTK) GO TO 60
C     SUFFICIENT AMMO ON TRUCK, DECREMENT AMMO ON TRUCK
      ITRUCK(NCSASP,6) = 10000*(NRONTK - NRDSND)/IMIX(MIX,NUMAM)
      IF(ITRUCK(NCSASP,6) .EQ. 0) GO TO 60
      IF(IFLAG .EQ. 1)THEN
         RNDS = NRDSND
         RNDAV = FRNN
         TDELAY = TDELAY + IMIX(MIX,32) * (RNDS/RNDAV)
      ELSE
         TDELAY = IMIX(MIX,32)
      END IF
C      SCHEDULE RELEASE OF S & P
      IIPARM(1) = NASP + 10
      IIPARM(2) = NCSASP
      IIPARM(3) = 0
      IIPARM(4) = 999
      CALL SCHED(13,IIPARM,TIME + TDELAY)      @ ASPAR2
      GO TO 80
C     INSUFFICIENT AMMO OR EXACTLY ENOUGH AMMO ON S&P
C     TIME TO SHIFT PARTIAL LOAD
  60  FRNN= NRDSND
      TLOAD = IMIX(MIX,32) * NRONTK / FRNN
      IF (IDAY .EQ. 0) TLOAD = 1.54*TLOAD
      TDELAY = TDELAY + TLOAD + 5.0
      NRDSND = NRDSND - NRONTK
      ITRUCK(NCSASP,6) = 0
      IIPARM(2) = NCSASP
      IIPARM(3) = 0
      IIPARM(4) = 555
      CALL SCHED(13,IIPARM,TIME + TDELAY)      @ ASPAR2
      IFLAG = 1
C     IF EXACTLY ENOUGH ROUNDS ON TRUCK, SEND BACK TO UNIT
      IF(NRDSND .EQ. 0) GO TO 80               @ RTN, SERVING S&P EMPTY
C     GO GET ANOTHER S&P TRUCK TO COMPLETE THE LOAD
C     OR COMPLETE FROM ON THE GROUND STOCK
      GO TO 50
   70 NRST = NRDSND
      TTLOAD = TLOAD + (IMIX(MIX,32))*(NRST / IMIX(MIX,NUMAM))
      IF (IDAY .EQ. 0) TTLOAD = 1.54*TTLOAD
      TDELAY = TDELAY + TTLOAD
C * * * DECREMENT ASP AMMO
  80  IASP(NASP,ONHAND) = IASP(NASP,ONHAND) - NRDSND
C     INCREMENT AMMO USED FROM ASP
      IASPAM(NASP,MIX) = IASPAM(NASP,MIX) + 1
C     INCREMENT ROUNDS ON-THE-WAY TO ATP
      IATP(NATP,ONHAND+2) = IATP(NATP,ONHAND+2) + IMIX(MIX,NUMAM)
C     SCHEDULE ATPAR2,  COMPUTE NECESSARY PARAMETERS
      ITKTYP = ITRUCK(NUMSP,1)
      TVLTIM = 60. * IATP(NATP,2) / ITYPE(ITKTYP,IDAY+3)
      IF(RDIST .GT. 0.)TVLTIM = 60. * RDIST / ITYPE(ITKTYP,IDAY+3)
      IPARM(4) = MIX
      NTIQ = TIME - ITRUCK(NUMSP,3)
      ITRUCK(NUMSP,12) = ITRUCK(NUMSP,12) + NTIQ @ TRUCK TIME IN QUEUE
      ITRUCK(NUMSP,13) = ITRUCK(NUMSP,13) + 1         @ # * @ ASP
      JASP(NASP,8) = JASP(NASP,8) + NTIQ
      IF(NTIQ .GT. JASP(NASP,9))JASP(NASP,9) = NTIQ
      ITRUCK(NUMSP,3) = 4
C     COMPUTE INTERDICTION TIME LOST
      CALL INTRDK(NUMSP,TMIND)
      IF(TMIND .LE. 0.) THEN
C        COMPUTE TIME LOST DUE TO TRUCK FAILURE
         CALL OPERA(NUMSP,TVLTIM,TFAIL)
      ELSE
         TFAIL = 0.
      END IF
C     CONSIDER LOAD TIME AT ASP WHICH MIGHT BE ZERO
      TMLD = IMIX(MIX,32)
C**** IF NO INTERDICTION, BYPASS
      IF(TMIND .GT. 0.) THEN
C****    DECREMENT AMMO AGAIN SINCE LOST A TRUCK LOAD
         IASP(NASP,ONHAND) = IASP(NASP,ONHAND) - NRDSND
         IASPAM(NASP,MIX) = IASPAM(NASP,MIX) + 1
C****    ADD ANOTHER LOAD TIME
         TMIND = TMIND + TMLD
      END IF
C     SCHEDULE ARRIVAL AT ATP AT TIME TOTTIM
      TOTTIM = TIME + TVLTIM + TMIND + TFAIL + TMLD + HITI
      ITRUCK(NUMSP,6) = 10000
      CALL SCHED(11,IPARM,TOTTIM)              @ ATPAR2
C
```

```
      IF(NEGSVR .EQ. 1)RETURN
      CALL OPERA(NUMSVR,TMLD,TFAIL)
      SVRTI = TIME + TMLD + TFAIL
      IPARM(1) = NASP + 10
      IPARM(2) = NUMSVR
      IPARM(3) = 1
      IPARM(4) = 0
      CALL SCHED(8,IPARM,SVRTI)                @ UNTARV
      ITRUCK(NUMSVR,10) = ITRUCK(NUMSVR,10) + 1 @ ATP-ASP S&P LOADUP
      ITRUCK(NUMSVR,6) = ITRUCK(NUMSVR,6) + INT(TMLD)
C
      RETURN
      END
```

f.   SUBROUTINE ASPAR2

```
      SUBROUTINE ASPAR2 (IPARM)
C**** EVENT ASPAR2 -- ARRIVAL OF S&P TRUCK AT ASP FROM CSA
C                     MAY SWITCH TRAIL WITH ATP S&P
C     EVENT TYPE 13
C     CALLED BY MAINARM
C     CALLS     PUTQUE, GETQUE, OPERA, INTRDK, SCHED, IQ, SERVER
C**** D. REMEN SEP 80
C**** IPARM(1) -- ASP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) --
C**** IPARM(4) -- 555:  S & P IS EMPTY   999:  PARTIAL LOAD RETURN
C                444: ARRIVAL FROM DAO
C**** SCHEDULES -- CSAARV, ARRIVAL OF S&P TRUCK AT CSA
C                  ASPAR2, RETURN OF EMPTY ASP S&P
C                  ATPAR2, RETURN OF EMPTY ATP S&P
C     SCHEDULED BY ASP, ASPAR1, ASPAR2, ATPAR1, CSADEP, SERVER, ATPAR2
C
C**** CHECKS -- DELAY DUE TO MTBF AND INTERDICTION
C     NOTE:    EACH TRACTOR HAS TWO TRAILERS!  ASP S&P TRACTORS STAY
C     -----    WITH THE EMPTY TRAILER.  (ATP TRACTORS STAY WITH THE FULL
C              TRAILER).
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5),ISPQ(10),IIPARM(5)
      INTEGER ONHAND
C
C**** LOCAL VARIABLES:
C**** MIX -- AMMO MIX NUMBER ON TRUCK
C**** DIST -- DIST TO ASP OR CSA
C**** TVLTIM -- TRAVEL TIME
C**** ITKTYP -- TRUCK TYPE
C**** TFAIL -- DELAY ENROUTE DUE TO FAILURE
C**** TOTIM -- TIME OF ARRIVAL OF TRUCK AT ASP OR CSA
C**** TMIND -- INTERDICTION TIME DELAY
C**** INDEX -- NUMBER OF QUEUE FOR CSA - ASP TRUCK
C**** IND -- INDEX FOR AMMO INVENTORY CONTROL IN IASP
C**** ISPQ()  -- S&P NUMBERS FROM QUEUE TO FORM A CONVOY
C
      NASP=IPARM(1)-10
      NUMSP = IPARM(2)
      ISTAT = IPARM(4)
C
C**** FIND THE MIX ON THE TRUCK
      MIX = ITRUCK(NUMSP,5)
      IF(MIX .LE. 0) THEN
         WRITE(6,1) NUMSP
  1      FORMAT(' ASPAR2 -- ZERO MIX ON TRUCK ',I4)
         RETURN
      END IF
C
      IOUT=0
C*************LOOK FOR OFFLOADED S&P RETURNING
      IF(ISTAT.EQ.555)THEN
```

```
         IASP(NASP,6)=IASP(NASP,6)+1
         CALL PUTQUE(NUMSP,IASP(NASP,4))
         ITRUCK(NUMSP,3) = TIME
      END IF
      IF(ISTAT .EQ. 999)THEN
         CALL PUTQUE(NUMSP,IASP(NASP,4))
         RETURN
      END IF
C
C***********CHECK FOR EMPTY S&P TO RETURN TO CSA IN CONVOY
      IF(IASP(NASP,6).GE.7)THEN
         DO 3 I = 1,10
            ISPQ(I) = 0
 3       CONTINUE
         CALL GETQUE(NUMSP,IASP(NASP,4))
         KOUNT=1
         IF(NUMSP.EQ.0)RETURN
         NCHKSP=NUMSP
         CALL PUTQUE(NCHKSP,IASP(NASP,4))
  13     CALL GETQUE(NUMSP,IASP(NASP,4))
         IF(ITRUCK(NUMSP,6).EQ.0)THEN
            ISPQ(KOUNT)=NUMSP
            IF(NUMSP.EQ.NCHKSP)GO TO 11
            IF(KOUNT .EQ. 7)GO TO 11
            KOUNT=KOUNT + 1
            GO TO 13
         ELSE
            CALL PUTQUE(NUMSP,IASP(NASP,4))
            IF(NUMSP.EQ.NCHKSP)GO TO 11
            GO TO 13
         END IF
C
C*********HAVE ALL THE EMPTY TRAILERS,FIND DISTANCE AND SCHEDULE
11       DIST=IASP(NASP,1)
         ITKTYP=ITRUCK(NUMSP,1)
         TVLTIM=60.*DIST/ITYPE(ITKTYP,IDAY+3)
         TS=1.
         DO 12 JJ=1,KOUNT
         NUMSP = ISPQ(JJ)
         NQTI = TIME - ITRUCK(NUMSP,3)
         ITRUCK(NUMSP,13) = ITRUCK(NUMSP,13)+ NQTI
         ITRUCK(NUMSP,14) = ITRUCK(NUMSP,14) + 1     @ # TIMES AT ASP
         ITRUCK(NUMSP,3) = 4
         CALL INTRDK(NUMSP,TMIND)
         IF(TMIND .LE. 0.) THEN
            CALL OPERA(NUMSP,TVLTIM,TFAIL)
         ELSE
            TFAIL = 0.
         END IF
         TOTIM=TVLTIM+TIME+TFAIL+TMIND+TS
         IIPARM(1)=NASP+10
         IIPARM(2)=NUMSP
         IIPARM(3)=0
         IIPARM(4) = 0
         TS=TS+1.
         IASP(NASP,6)=IASP(NASP,6)-1
12       CONTINUE
      END IF
      IF(IOUT.EQ.555)RETURN
C
C * * * INCREMENT AMMO ON HAND AT THIS ASP/ DECR ON-   -WAY
      NUMAM = MIX - LPPAR(8)
      ONHAND = NUMAM * 3 + 19
      IASP(NASP,ONHAND) = IASP(NASP,ONHAND) + (IMIX(MIX,NUMAM)
     Z  * ITRUCK(NUMSP,6) + 9999) / 10000
      IASP(NASP,ONHAND+2) = IASP(NASP,ONHAND+2) - (IMIX(MIX,NUMAM)
     Z  * ITRUCK(NUMSF,6) + 9999) / 10000
      ICSTYP = NUMAM
C
C * * * * ARRIVAL COUNTERS
      IASPSP(NASP,NUMAM) = IASPSP(NASP,NUMAM) + 1
      IF (ISTAT .EQ. 444) THEN
         ITRUCK(NUMSP,11) = ITRUCK(NUMSP,11) + 1 @ # ARRIVIALS FROM DAO
         IASPAM(NASP,70+ICSTYP) = IASPAM(NASP,70+ICSTYP) + 1
      ELSE
         ITRUCK(NUMSP,10) = ITRUCK(NUMSP,10) + 1 @ # ARRIVIALS FROM CSA
         IASPAM(NASP,90+ICSTYP) = IASPAM(NASP,90+ICSTYP) + 1
      END IF
C**** UPDATE TRUCK STATUS TO THE CSA-ASP QUEUE
      ITRUCK(NUMSP,3)= 3
C** LOOK FOR ASP-ATP S&P OF SAME MIX
      IF(ICSTYP .GT. 10) GO TO 30
      NATPQ = IQ(11,NASP)
      CALL GETQUE(NATPSP,NATPQ)
      IF(NATPSP .EQ. 0)GO TO 30
      IATPCK = NATPSP
      CALL PUTQUE(NATPSP,NATPQ)
  40  CALL GETQUE(NATPSP,NATPQ)
      MIXX = ITRUCK(NATPSP,5)
      IATPTY = MIXX - LPPAR(8)
      IF (ICSTYP .EQ. IATPTY) GO TO 70
         CALL PUTQUE(NATPSP,NATPQ)
         IF(IATPCK .EQ. NATPSP) GO TO 30
         GO TO 40
C** HAVE FOUND ASP-ATP S&P WITH SAME AMMO TYPE:
C** SWAP LOAD FROM CSA TO ATP S&P
C** SCHEDULE RELEASE OF CSA S&P
  70  ITRUCK(NUMSP,6) = 0
      IPARM(4) = 555
      CALL SCHED(13,IPARM,TIME+30.)            @ ASPAR2
C** SCHEDULE ASP-ATP S&P TO ATP
      NATP = ITRUCK(NATPSP,4) - 75
      IPARM(1) = NATP
      IPARM(2) = NATPSP
      IPARM(3) = NASP
      IPARM(4) = 0
      DIST = IATP(NATP,2)
      ITKTYP = ITRUCK(NATPSP,1)
      CALL INTROK(NATPSP,TMIND)
      IF(TMIND .LE. 0.) THEN
         CALL OPERA(NATPSP,TVLTIM,TFAIL)
      ELSE
         TFAIL = 0.
      END IF
      TOTIM = TIME + TVLTIM + TFAIL + TMIND + 30. @ 30 MIN UNH/H TI
      CALL SCHED(11,IPARM,TOTIM)                @ ATPAR2
C
      NTIQ = TIME - ITRUCK(NATPSP,3)
      JASP(NASP,8) = JASP(NASP,8) + NTIQ
      IF (NTIQ .GT. JASP(NASP,9)) JASP(NASP,9) = NTIQ
      ITRUCK(NATPSP,12) = ITRUCK(NATPSP,12) + NTIQ
      ITRUCK(NATPSP,11) = ITRUCK(NATPSP,11) + 1 @ THRU PUT COUNTER
C
      ITRUCK(NATPSP,3) = 4
      ITRUCK(NATPSP,6) = 10000
C
      JASP(NASP,7) = JASP(NASP,7) + 1 @ INCREMENT ASP-ATP TRUCKS SERVED
C
      IASPAM(NASP,60+ICSTYP) = IASPAM(NASP,60+ICSTYP)  + 1 @ # SERVED
      IASP(NASP,ONHAND) = IASP(NASP,ONHAND) - IMIX(MIXX,IATPTY)
C        DEMAND = ONHAND + 1
      IASP(NASP,ONHAND+1) = IASP(NASP,ONHAND+1) - IMIX(MIXX,IATPTY)
C
      RETURN
C*********PUT OTHER TRUCKS INTO THE QUE
   30 INDEX = IQ(7,NASP)
      CALL PUTQUE(NUMSP,INDEX)
C
C **** IF SERVER AVAILABLE, OFF-LOAD ARRIVING CSA S&P
      IQSVR = IASP(NASP,7)
      CALL GETQUE(NUMSVR,IQSVR)
      IF(NUMSVR .GT. 0)THEN
         IPARM(2) = NUMSVR
         IPARM(3) = 1
         CALL SERVER(IPARM)
      END IF
      RETURN
      END
```

g. SUBROUTINE ATP

```
      SUBROUTINE ATP (IPARM)
C**** EVENT ATP -- SERVICE OF TRUCK FROM QUEUE AT ATP.
C                  LOADS OFF S&P(USE FORKLIFT/CRAIN) OR OFF THE GROUND.
C     EVENT TYPE 6
C     CALLED BY MAINARM
C     CALLS     IQ, FINTK, SCHED, OPERA, LDPWDR(FOR ARTY), INTRDK
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) --   1 = ARTILLERY QUEUE,      2 = MANUEVER QUEUE
C**** IPARM(2) --   ATP NUMBER
C**** IPARM(3) --   UNIT TRUCK NUMBER
C**** IPARM(4) --   SERVER NUMBER
C     SCHEDULES    ASPARV, FOR INTRDKED UNIT TRUCKS
C                  ATPAR1, CSA S&P -> ATP
C                  ATPARV, RESCHEDULE ATP EVENT
C                  UNTARV, SERVER OR UNIT TRUCK RETURNS
C                  ATPAR2, ASP S&P -> ATP
C     SCHEDULED BY ATPARV, DEPASP, SERVER
C
C**** NOTE !!! IN THIS ROUTINE NUMTK(N,3) CONTIANS THE TIME THE
C     TRUCK ENTERED THE QUEUE !
C
C
C     (1) TAKES TRUCK OUT OF ITS QUEUE
C     (2) CALCULATES LOAD TIME AS FUNCTION OF LOAD MIX
C         NUMBER AND NUMBER OF SERVERS ACTIVE FOR THIS QUEUE.
C
C**** CHECKS  --  DELAY IN ARRIVAL DUE TO MTBF AND INTERDICTION.
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5), IIPARM(5)
C     LOCAL VARIABLE DEFINITION
C     NUMTK - TRUCK TO BE SERVED
C     MIX - INDEX OF AMMO MIX ON TRUCK
C     NRNDSN - NUMBER OF ROUNDS NEEDED BY THE TRUCK NUMTK
C     NUMAM - TYPE OF ROUNDS NEEDED BY NUMTK
C     NATP - ATP NUMBER
C     NRND - NUMBER OF POWDER CHARGES NEEDED
C     NATPQ -- NUMBER OF THE ASP<->ATP TRUCK QUEUE
C     NUMSP - NUMBER OF ASP ATP TRUCK
C     NRONSP - NUMBER OF ROUNDS ON SUPPLY S&P
C     MIXX - MIX INDEX OF AMMO ON SUPPLY S&P
C     DIST - ROAD DIST TO BE TRAVELED
C     TVLTIM - ROAD TRAVEL TIME
C     TFAIL - TIME DELAY DUE TO FAILURE
C     TMIND - TIME DELAY DUE TO INTERDICTION
C     TOTTIM - TIME TO SCHEDULE ATP OR ASP ARRIVAL
C     TPAR - TIME REQUIRED TO SHIFT A PARTIAL LOAD
C     ETIME  - DELAY TIME FOR ATPARV
C     DTIME  - DELAY TIME FOR UNTARV
C     FRNN - REAL VARIABLE FOR NUMBER OF ROUNDS NEEDED
C     TLOAD - LOAD TIME
```

```
9999  TLOAD = 0.
      TDELAY = 0.
      IFLAG = 0.
      TTDEL = 0.
C
      IQTYPE = IPARM(1)
      NATP = IPARM(2)
      NUMTK = IPARM(3)
      NUMSVR = IPARM(4)
      IPARM(3) = 0
      IPARM(4) = 0
C
      DO 1 I =1,5
         IIPARM(I) = 0
    1 CONTINUE
C     FIND THE QUEUE WAIT TIME AND ADD IT TO TOTAL QUEUE WAIT TIME
      NTQUE = TIME - ITRUCK(NUMTK,3)
      ITRUCK(NUMTK,12) = ITRUCK(NUMTK,12) + NTQUE
      JATP(NATP,KVAL+1) = JATP(NATP,KVAL+1) + NTQUE
C     IF THIS IS THE LARGEST WAIT, STORE IT
      IF(NTQUE.GT.JATP(NATP,KVAL+2)) JATP(NATP,KVAL+2)=NTQUE
      IF(ITRUCK(NUMTK,6) .GT. 0)TTDEL = 15.
C     FIND AMMO MIX INDEX OF TRUCK  MIX
      MIX = ITRUCK(NUMTK,5)
C     FIND AMMO TYPE WANTED.  ASSUME ONLY ONE TYPE
      NUMAM = MIX
      IF(MIX .GT. LPPAR(7))NUMAM = MIX - LPPAR(7)
C     RECORD NUMBER OF ROUNDS NEEDED - NRNDSN
      NRNDSN = IMIX(MIX,NUMAM)-((ITRUCK(NUMTK,6)*IMIX(MIX,NUMAM)+
     Z  9999)/10000)
C    NOW TO LOCATE S & P CONTAINING PROPER TYPE OF AMMO
C     FIRST CHECK CSA S & PS. PASS AMMO AND QUEUE TO CHECK.
      NATPQ = IQ(IATPSD(2),NATP)
  130 CALL FINTK(NATPQ,NUMAM,NUMSP,0)
      IF(NUMSP .EQ. 0)THEN
C        NO CSA TRUCK SO TRY ASP-ATP TRUCK
C   **** IF HAVE LOOKED AT ASP QUEUE, THERE IS NO AMMO GO TO 142, TRUCK LOS
         IF(NATPQ.EQ.IQ(IATPSD(3),NATP)) GO TO 142
         NATPQ=IQ(IATPSD(3),NATP)
         GO TO 130
C    **** WRITE FLAG
  142    WRITE(6,141) NATP,NUMAM,TIME
  141    FORMAT(' ATP  ',I2,' S&PS BUSY FOR AMMO ',I2,' AT TIME ',F8.2)
         WRITE(LUOUT,141)NATP,NUMAM,TIME
         IPARM(1) = ITRUCK(NUMTK,4)
         IPARM(2) = NUMTK
         IPARM(3) = NATP
         IPARM(4) = 999
         ETIME = TIME
         IF(ITRUCK(NUMTK,6) .LE. 0)ETIME = ETIME + 15.
         CALL SCHED(4,IPARM,ETIME + TDELAY + TTDEL)           @ ATPARV
         IF(NUMAM .EQ. 10)THEN
            IIPARM(1) = NATP
            IIPARM(2) = -1
            CALL SCHED(3,IIPARM,ETIME + TDELAY)                 @ UNTARV
            RETURN
         END IF
         ITRUCK(NUMSVR,3) = 4
         CALL OPERA(NUMSVR,TLOAD,TFAIL)
         DTIME = TIME + TLOAD + TFAIL
         IPARM(1) = NATP
         IPARM(2) = NUMSVR
         IPARM(3) = 0
         IPARM(4) = 0
         CALL SCHED(3,IPARM,DTIME)                              @ UNTARV
         RETURN
      END IF
C     FIND THE NUMBER OF ROUNDS ON NUMSP. IF SUFFICIENT, DECREMENT
C     AMMO, SCHEDULE UNTARV, PUT S & P BACK IN ASP Q.
C     IF INSUFFICIENT EMPTY CSA S & P, SEND TO CSA, DECREMENT
C     THE NUMBER OF ROUNDS REQUIRED, FIND ANOTHER S & P WITH
C     THE PROPER AMMO
C     UPDATE PER CENT ROUNDS ON THE S & P
      MIXX = ITRUCK(NUMSP,5)
      NRONSP =(IMIX(MIXX,NUMAM)*ITRUCK(NUMSP,6)+9999)/10000
      WRITE(LUOUT,300)MIX,MIXX,NUMAM,NRNDSN,NUMTK,NRONSP,NUMSP,NATPG
  300 FORMAT('   IATP ',8I6)
C     IF INSUFFICIENT ROUNDS GO TO 150
      IF(NRNDSN .GT. NRONSP)GO TO 150
C     SUFFICIENT AMMO ON S & P.  DECREMENT AMMO ON S & P.
C     IF ARTY AMMO GO LOAD POWDER
      NRND = IMIX(MIX,NUMAM)
      IF(NUMAM.GT.2.AND.NUMAM.LE.7)CALL LDPWDR(NRND,IPARM,NUMAM)
      ITRUCK(NUMSP,6) = 10000 * (NRONSP - NRNDSN) / IMIX(MIXX,NUMAM)
C     SCHEDULE RELEASE OF S & P (SCHED ATPAR1 OR 2)
      IF(IFLAG.EQ.1)THEN
         TDELAY = TDELAY + IMIX(MIX,31) * (NRNDSN/FRNN)
      ELSE
         IF(NUMAM .GT. 3 .AND. NUMAM .LE. 7)THEN
            TDELAY = (IMIX(MIX,31)/2)
         ELSE
            TDELAY = IMIX(MIX,31)
         END IF
      END IF
  135 IIPARM(1) = NATP
      IIPARM(2) = NUMSP
      IIPARM(4) = 555
      IF(IDAY .EQ. 0)TDELAY = 1.54 * TDELAY
      TOTIM = TIME + TDELAY
      IF(NUMSP .GE. IATPSD(1))THEN
         CALL SCHED(11,IIPARM,TOTIM)                            @ ATPAR2
      ELSE
         CALL SCHED(10,IIPARM,TOTIM)                            @ ATPAR1
      END IF
C     GO TO SCHEDULE UNTARV
      GO TO 200
C**** INSUFFICIENT AMMO OR EXACTLY ENOUGH AMMO ON S & P
C     TIME TO SHIFT PARTIAL LOAD
```

```
      TPAR = IMIX(MIX,31) * (NRONSP / FRNN) + 5.0
      NRNDSN = NRNDSN - NRONSP
      ITRUCK(NUMSP,6) = 0
      ITRUCK(NUMTK,6) = (NRONSP/FRNN) * 10000
C     SCHEDULE RELEASE OF S & P (SCHED ATPAR1 OR 2)
      IF(IFLAG .EQ. 1)THEN
         TDELAY = TDELAY + TPAR
         GO TO 151
      ELSE
         TDELAY = TPAR
      END IF
  151 IIPARM(1) = NATP
      IIPARM(2) = NUMSP
      IIPARM(4) = 555
      IF(IDAY .EQ. 0)TDELAY = 1.54 * TDELAY
      TOTIM = TIME + TDELAY
      IF(NUMSP .GE. IATPSD(1))THEN
         CALL SCHED(11,IIPARM,TOTIM)                                @ ATPAR2
      ELSE
         CALL SCHED(10,IIPARM,TOTIM)                                @ ATPAR1
      END IF
C**** IF EXACTLY ENOUGH ROUNDS ON TRUCK,SEND TRUCK BACK TO UNIT
      IF(NRNDSN.EQ.0) GO TO 200
C     GO GET ANOTHER ASP-ATP TRUCK TO COMPLETE THE LOAD
      IFLAG = 1
      GO TO 130
C     HAVE SUFFICIENT AMMO, SCHEDULE UNTARV AND NEXT ATP DECREMENT
  200 IATP(NATP,IQTYPE+13) = IATP(NATP,IQTYPE+13) - 1
      IF(IATP(NATP,IQTYPE+13) .LE. 0)IATP(NATP,IQTYPE+13)=0
C     DECREMENT AMMO AND AMMO DEMAND
      IATP(NATP,NUMAM*3+18) = IATP(NATP,NUMAM*3+18)
     Z   - IMIX(MIX,NUMAM)
      IATP(NATP,NUMAM*3+19) = IATP(NATP,NUMAM*3+19) -
     Z    IMIX(MIX,NUMAM)
      IF(NUMAM .GT. 2 .AND. NUMAM .LE. 5)THEN
         IATP(NATP,27) = IATP(NATP,27) - IMIX(MIX,NUMAM)
         IATP(NATP,28) = IATP(NATP,28) - IMIX(MIX,NUMAM)
         IATP(NATP,51) = IATP(NATP,51) - IMIX(MIX,NUMAM)
      ELSE
         IF(NUMAM .GT. 5 .AND. NUMAM .LE. 8)THEN
            IATP(NATP,42) = IATP(NATP,42) - IMIX(MIX,NUMAM)
            IATP(NATP,43) = IATP(NATP,43) - IMIX(MIX,NUMAM)
            IATP(NATP,51) = IATP(NATP,51) - IMIX(MIX,NUMAM)
         END IF
      END IF
C**** CHARGE AMMO ISSUED
      MIXIND = MIX                        @ 10TON LOAD
      IF(ITRUCK(NUMTK,1) .NE. 1)MIXIND = MIX - 20 @ 5TON OR 10TON MLRS
      IF(ITRUCK(NUMTK,5) .EQ. 10)MIXIND = MIX @ MLRS 10TON W/12 TLR
      IATPAM(NATP,MIXIND)=IATPAM(NATP,MIXIND)+1
      IF(IFLAG .EQ. 1)THEN
         TLOAD = TDELAY
      ELSE
         TLOAD=IMIX(MIX,31)
      IF (IDAY.EQ.0) TLOAD = 1.54*TLOAD
C**** CHECK IF MLRS AND SCHEDULE DEPARTURE
      IF (NUMAM .EQ. 10) THEN
        DTIME = TIME + TLOAD
        IIPARM(1) = NATP
        IIPARM(2) = -1
        IIPARM(4) = 0
        CALL SCHED(8,IIPARM,DTIME)                              @ UNTARV
      CONTINUE
      END IF
C     SET THE VALUE FOR ARTY OR MANUVER QUEUE
      KVAL = 4
      IF(IQTYPE .EQ. 2) KVAL = 1
C     ADD ONE TO THE NUMBER SERVED BY THIS QUEUE
      JATP(NATP,KVAL) = JATP(NATP,KVAL) + 1
      IF(NUMAM .EQ. 10)GO TO 158
C**** SCHEDULE THE AVAILABILITY OF THE SERVER
      ITRUCK(NUMSVR,3) = 4
      CALL OPERA(NUMSVR,TLOAD,TFAIL)
      DTIME = TIME + TLOAD + TFAIL
      IPARM(1) = NATP
      IPARM(2) = NUMSVR
      CALL SCHED(8,IPARM,DTIME)                                 @ UNTARV
      ITRUCK(NUMSVR,6) = ITRUCK(NUMSVR,6) + TLOAD
      IF(ITRUCK(NUMTK,1) .EQ.1) THEN
         ITRUCK(NUMSVR,12) = ITRUCK(NUMSVR,12) + 1 @ 10 TON CNTR
      ELSE
         ITRUCK(NUMSVR,11) = ITRUCK(NUMSVR,11) + 1 @ 5 TON CNTR
      END IF
C
C     SCHEDULE UNTARV OF SUPPLY TRUCK
  158 ITRUCK(NUMTK,3) = 4
      CALL INTRDK(NUMTK,TMIND)
      NUNIT = ITRUCK(NUMTK,4)
      IPARM(1) = NUNIT
      IPARM(2) = NUMTK
      NTYP = IUNIT(NUNIT,1)
C ***** IF SUPPLY TRUCK INTERDICTED, SCHEDULE ASPARV
      IF(TMIND .GT. 0)THEN
         ITRUCK(NUMTK,6) = 0
         IPARM(3) = IUNIT(NUNIT,3)
         IPARM(4) = ITRUCK(NUMTK,5)
         TOTTIM = TIME + TMIND + TLOAD
         CALL SCHED(5,IPARM,TOTTIM)                             @ ASPARV
         JUNIT(NTYP,14) = JUNIT(NTYP,14) + 1
         RETURN
      END IF
      DIST = IUNIT(NUNIT,4)
      ITKTYP = ITRUCK(NUMTK,1)
      TVLTIM = 60. * DIST / ITYPE(ITKTYP,IDAY+1)
      CALL OPERA(NUMTK,TVLTIM,TFAIL)
      JUNIT(NTYP,13) = JUNIT(NTYP,13) + 1
C     ADD TO THE NUMBER KILLED AND FAILED THIS TRIP
      IF(TFAIL .GT. 0) JUNIT(NTYP,15) = JUNIT(NTYP,15) + 1
      JUNIT(NTYP,16) = JUNIT(NTYP,16) + NTQUE + TLOAD + TVLTIM
      TOTTIM = TIME + TVLTIM + TFAIL + TLOAD
      CALL SCHED(9,IPARM,TOTTIM)                                @ UNTARV
      ITRUCK(NUMTK,6) = 10000
C
      RETURN
      END
```

h.   SUBROUTINE ATPARV

```
      SUBROUTINE ATPARV (IPARM)
C**** EVENT ATPARV -- ARRIVAL OF UNIT TRUCK AT ATP
C                    FIND FORKLIFT OR CRAIN, AND A S&P (SCHED ATP)
C     EVENT TYPE 4
C     CALLED BY MAINARM
C     CALLS     SCHED, IQ, FINTK, PUTQUE, GETQUE, OPERA, INTRDK
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ATP NUMBER
C**** IPARM(4) -- MIX OR 999 = RETURN OF PARTIALLY LOADED UNIT TRUCK
C
C**** SCHEDULES   -- ASPARV, ARRIVAL OF UNIT TRUCK AT ASP
C                   (IF AMMO IS NOT CURRENTLY ON HAND FOR ALL
C                   TRUCKS IN QUEUE)
C                 -- ATP,SERVICE OF UNIT TRUCK FROM QUEUE AT ATP
C                 -- ATPARV, RESCHEDULE 30 MIN LATER
C**** SCHEDULED BY   ATP, ATPARV, UNTDEP
C                   (IF ATP SERVICE WAS IDLE FOR THIS QUEUE)
C
C**** DATA REQUIRED    --  AMMO REQUIRED BY TRUCKS IN QUEUE.
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C     LOCAL VARIABLES DEFINED
C     NUMQ - ATP QUEUE FOR ARTY OR ROUTINE SERVICE
C     NUMQS - SERVER QUEUE
C     MIX - INDEX OF AMMO MIX USED TOACCESS IMIX.
C     NEEDTK - NUMBER OF ROUNDS NEEDED TYPE I BY UNIT  TRUCK.
C     INDEX - INDEX COMPUTED FOR AMMO TYPE I TO ACCESS
C          ONHAND AND WANTED BY TRUCK IN QUEUE.
C     JONHAND - AMOUNT OF AMMO TYPE I PRESENTLY ON HAND AT ATP
C     NUMOLD - CHECK TRK FOR SERVER
C     NEEDOT - AMOUNT OF AMMO I NEEDED BY OTHER TRUCKS IN QUEUE.
C     MANART - FLAG SET TO 2 IF MANEUVER AMMO, 1 IF ARTY AMMO
C     DIST - DIST FROM ASP TO ATP.
C     TVLTIM - UNOPPOSED TRAVEL TIME.
C     TFAIL - TRAVEL TIME INCREMENT DUE TO MECHANICAL FAILURE
C     TMIND - TRAVEL TIME INCREMENT DUE TO INTERDICTION
C     NFAOMD - TOTAL RDS NEEDED BY ALL ARTY TRKS
C     TOTIM - TIME OF TRUCK ARRIVAL AT ASP
C
      NFLAG = 0                                @ S&P FLAG
      NUNIT = IPARM(1)
      NUMTK = IPARM(2)
      NATP  = IPARM(3)
      IPART = IPARM(4)
C
C     DETERMINE AMMO MIX WANTED BY THE TRUCK.
      MIX = ITRUCK(NUMTK,5)
C *** IF ATP ASSIGNMENT HAS CHANGED WHILE UNIT TRUCK IS ENROUTE,
      LATP = IUNIT(NUNIT,2)
      IF(NATP .NE. LATP)THEN
         IPARM(3) = LATP
         CALL SCHED(4,IPARM,TIME + 30.)                        @ ATPARV
         RETURN
      END IF
      IF(MIX.LE.0) THEN
         WRITE(6,10) NUMTK
  10     FORMAT(' ATPARV -- ZERO MIX ON TRUCK ',I4)
         RETURN
      END IF
C     SET ITRUCK(N,3) EQUAL TO THE TIME OF QUEUE ENTRY. THIS
C     ALLOW QUEUE WAIT TIME TO BE FOUND FOR THE TRUCK
      ITRUCK(NUMTK,3) = TIME
C     FIND THE UNIT TYPE
      JTYP = IUNIT(NUNIT,1)
      IF(IUNIT(NUNIT,2).EQ.0)GO TO 400
      NUMAM = MIX
      IF(MIX .GT. LPPAR(7))NUMAM = MIX - LPPAR(7)
C     DETERMINE QUANTITY NEEDED ON THIS TRUCK (NEEDTK)
      NEEDTK = IMIX(MIX,NUMAM)-(ITRUCK(NUMTK,6)*IMIX(MIX,NUMAM)+
     Z  9999/10000)
C     ASSUME MANEUVER AMMO.
      MANART = 2
C     IF ARTY RESET MANART
      IF(NUMAM .GT. LPPAR(3) .AND. NUMAM .NE. 9)MANART = 1
      IF(IPART .EQ. 999)GO TO 25
C     HOW MANY ROUNDS ARE NFEDED BY THE OTHER TRUCKS IN THE QUEUE
      INDEX = NUMAM * 3 + 19
      NEEDOT = IATP(NATP,INDEX)
C     HOW MANY ROUNDS I ARE AT ATP - JONHND
      JONHND = IATP(NATP,INDEX - 1)
C     IF INSUFFICIENT ON HAND GO TO 400
      IF(JONHND .LT. NEEDOT + NEEDTK)GO TO 400
C**** CHECK IF A S & P IS AVAILABLE FOR RELOADING
  25  NATPQ = IQ(IATPSD(2),NATP)
  30   CALL FINTK(NATPQ,NUMAM,NUMSP,0)
      IF(NUMSP .NE. 0)GO TO 40
      IF(NATPQ .NE. IQ(IATPSD(3),NATP))THEN
         NATPQ = IQ(IATPSD(3),NATP)
         GO TO 30
      ELSE
         IF(IPART .EQ. 999)GO TO 200
         IF(NUMAM .GE. 4 .AND. NUMAM .LE.7)THEN
            GO TO 50
         ELSE
            GO TO 60
         END IF
      END IF
C        HAVE FOUND A TRUCK, PUT BACK IN QUEUE
 40   CALL PUTQUE(NUMSP,NATPQ)
      NFLAG = 1
      IF(IPART .EQ. 999)GO TO 80
C     IF NOT ARTY GO TO 60
```

```
      IF(MANART .EQ. 1 .AND. NUMAM .EQ. 10) GO TO 60
C     HAVE ARTY IS THERE SUFFICIENT POWDER
C    HOW MANY RDS ARE NEEDED BY ALL ARTY TRKS IN QUEUE(SUFFICIENT FCS?)
  50  IF (NUMAM .LE. 5) THEN
        NFADMD = IATP(NATP,31) + IATP(NATP,34)
        IF(IATP(NATP,27) - IATP(NATP,28) .GE. NFADMD + NEEDTK) THEN
            GO TO 60
         ELSE
            GO TO 400
         END IF
      ELSE
        NFADMD = IATP(NATP,37) + IATP(NATP,40)
        IF(IATP(NATP,42) - IATP(NATP,43) .GE. NFADMD + NEEDTK) THEN
            GO TO 60
         ELSE
            GO TO 400
         END IF
      END IF
   60 CONTINUE
C     ADD TO QUEUE DEMAND FOR AMMO TYPE
      IF(IPART .EQ. 999)GO TO 80
      INDEX = NUMAM * 3 + 19
      IATP(NATP,INDEX) = IATP(NATP,INDEX) + IMIX(MIX,NUMAM)
C**** IF ARTY ADD TO POWDER , IF NOT GO TO 70
      IF(MANART .EQ. 1 .AND. NUMAM .GT. 9) GO TO 70
      IF(MANART.EQ.2) GO TO 70
      IF(NUMAM .GT. LPPAR(3) .AND. NUMAM .LE. 5)THEN
         IATP(NATP,28)=IATP(NATP,28)+IMIX(MIX,NUMAM)
         ELSE IF(NUMAM .GT. 5 .AND. NUMAM .LT. 9)THEN
         IATP(NATP,43)=IATP(NATP,43)+IMIX(MIX,NUMAM)
      END IF
   70 CONTINUE
C     INCREMENT NUMBER OF TRUCKS IN THE QUEUE
      IATP(NATP,MANART +13) = IATP(NATP,MANART+13) + 1
      IF(NFLAG .EQ. 0)GO TO 200                  @ NO S&P
C**** IF MLRS TRUCK SCHED ATP EVENT NOW
C     IF THERE ARE LESS THAN 3 TRUCKS ALREADY LOADING
  80  IF (NUMAM .EQ. 10) THEN
        IF(IATP(NATP,3) .LT. 3) THEN
          IATP(NATP,8) = IATP(NATP,8) + 1
          IPARM(1) = 1
          IPARM(2) = NATP
          IPARM(3) = NUMTK
          IPARM(4) = NUMTK
          CALL SCHED(6,IPARM,TIME)                             @ ATP
          RETURN
        ELSE
          ITRUCK(NUMTK,15) = ITRUCK(NUMTK,15) + 1 @ MLRS WAITS FOR 3
          GO TO 200
        END IF
      END IF
C**** FIND THE QUEUE FOR SERVERS
      NUMQS = IATP(NATP,10)
C     GET A SERVER FROM THIS QUEUE
```

```
      NUMOLD = NUMSRV
C     IF NO SERVER PUT THE TRUCK IN ITS PROPER QUEUE
      IF(NUMSRV .EQ. 0)THEN
         IATP(NATP,20) = IATP(NATP,20) + 1 @ 'NO SERVER' CNTR
         GO TO 200
      END IF
C     HAVE A SERVER PROCESS THE MANUVER OR ARTY QUEUE AS DIRECTED
      IF(MANART .EQ. 2) THEN
100   IF(ITRUCK(NUMSRV,1) .NE. 8) GO TO 110
C****   HAVE A FORKLIFT FOR MANUVER TRUCK, SCHEDULE ATP EVENT
        IPARM(1) = 2
        IPARM(2) = NATP
        IPARM(3) = NUMTK
        IPARM(4) = NUMSRV
        CALL SCHED(6,IPARM,TIME)                                @ ATP
        RETURN
C
C****   NOT A FORKLIFT, TRY AND FIND ONE
  110   CALL PUTQUE(NUMSRV,NUMQS)
C       GET A NEW SERVER
        CALL GETQUE(NUMSRV,NUMQS)
        IF(NUMSRV .NE. NUMOLD) GO TO 100
      ELSE
C**** PROCESSING AN ARTY TRUCK
  120   IF(ITRUCK(NUMSRV,1) .NE. 9) GO TO 130
C****   HAVE A CRANE WITH THE ARTY TRUCK SCHEDULE ATP EVENT
        IPARM(1) = 1
        IPARM(2) = NATP
        IPARM(3) = NUMTK
        IPARM(4) = NUMSRV
        CALL SCHED(6,IPARM,TIME)                                @ ATP
        RETURN
C       NOT A CRANE, TRY AND FIND ONE
  130   CALL PUTQUE(NUMSRV,NUMQS)
C       GET A NEW SERVER
        CALL GETQUE(NUMSRV,NUMQS)
        IF(NUMOLD .NE. NUMSRV) GO TO 120
C       CANNOT FIND A CRANE, USE THE FORKLIFT
        IPARM(1) = 1
        IPARM(2) = NATP
        IPARM(3) = NUMTK
        IPARM(4) = NUMSRV
        CALL SCHED(6,IPARM,TIMF)                                @ ATP
        RETURN
C
      END IF
C     FIND QUEUE NUMBER - NUMQUE
  200 NUMQ = IATP(NATP,MANART +10)
      CALL PUTQUE(NUMTK,NUMQ)
      RETURN
C     INSUFFICIENT AMMO SEND TO ASP
C     FIND DIST TO ASP
  400 DIST = IUNIT(NUNIT,5)-IUNIT(NUNIT,4)
      ITKTYP = ITRUCK(NUMTK,1)
```

```
C     CHANGE TRUCK STATUS CODE
      ITRUCK(NUMTK,3) = 5
C     COMPUTE INTERDICTION DELAY - TMIND
      CALL INTRDK(NUMTK,TMIND)
      IF(TMIND .LE. 0.) THEN
C        COMPUTE DELAY DUE TO FAILURE - TFAIL
         CALL OPERA(NUMTK,TVLTIM,TFAIL)
      ELSE
         TFAIL = 0.
      END IF
C     COMPUTE ASP ARRIVAL TIME - TOTIM
      TOTIM = TIME +TVLTIM + TFAIL + TMIND
C**** RECORD NO. OF TRUCKS BUMPED TO ASP
      INDEX = NUMAM + 20  @ 10TON BUMPED
      IF(ITRUCK(NUMTK,1) .NE. 1) INDEX = NUMAM + 30 @ 5T OR 10T MLRS
      IF(ITRUCK(NUMTK,5).EQ.10)INDEX = NUMAM+20 @ MLRS 10TON W/ 12 TLR
      IATPAM(NATP,INDEX)= IATPAM(NATP,INDEX) + 1
      IPARM(3) = IUNIT(NUNIT,3)
C     TRUCK IS BEING BUMPED TO ASP, ADD ONE TO THE NUMBER SENT
      JUNIT(JTYP,9) = JUNIT(JTYP,9) + 1
C     ADD TO THE INTERDICTION AND FAILURE COUNTERS FOR THIS MOVE
      IF(TMIND .GT. 0)JUNIT(JTYP,10) = JUNIT(JTYP,10) + 1
      IF(TFAIL .GT. 0) JUNIT(JTYP,11) = JUNIT(JTYP,11) + 1
C     ADD THE TRAVEL TIME TO THE CUMULATIVE TRAVEL TIME FOR THIS MOVE
      JUNIT(JTYP,12) = JUNIT(JTYP,12) + TVLTIM
      IPARM(4)=ITRUCK(NUMTK,5)
      CALL SCHED(5,IPARM,TOTIM)                                 @ ASPARV
      ITRUCK(NUMTK,14) = ITRUCK(NUMTK,14) + 1       @ BUMP TO ASP CNTR
C
      RETURN
      END
```

i.   SUBROUTINE ATPAR1

```
       SUBROUTINE ATPAR1 (IPARM)
C**** EVENT ATPAR1  --  ARRIVAL OF S & P AT ATP FROM CSA
C                       LOOKS FOR EMPTY TRAIL TO TAKE BACK TO CSA
C      EVENT TYPE 10
C      CALLED BY MAINARM
C      CALLS     OPERA, SCHED, IQ, PUTQUE, GETQUE, INTRUK
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- ATP NUMBER
C**** IPARM(2) -- S&P NUMBER
C**** IPARM(3) -- ASSOCIATED ASP NUMBER (MIX IF CSA TO CFA-ATP LINK)
C**** IPARM(4) -- 555 :  RETURN FROM RELOAD   333:  ARRIVAL AT DAD
C                 MIX  IF FROM CSADEP
C
C      SCHEDULES     ASPAR2, BUMP -> ASP IF ATP IS OVERSTOCKED
C                    ATPAR1, RESCHEDULE IN 30 MIN OR DIVERT TO 2ND ATP
C                    CSAARV, EMPTY TRUCK TO CSA
C      SCHEDULED BY  ATP, ATPAR1, CSADEP
C**** PUTS TRUCK IN CSA-ATP QUEUE
C
C**** CHANGES        --  ATP AMMO SUPPLY.
C      NOTE:    EACH TRACTOR HAS TWO TRAILERS!  FOR ATP S&PS THE TRACTOR
C      -----    IS ASSOCIATED WITH A FULL TRAILER (AT THE ASP THE TRACTOR
C               GOES WITH THE EMPTY TRAILER).
C
       INCLUDE LOG,LIST
       DIMENSION IPARM(5) ,IIPARM(5)
       INTEGER AVAIL
C
C**** LOCAL VARIABLES
C**** MIX   -- MIX OF AMMO INDEX CARRIED ON THE TRUCK FROM THE CSA
C**** NATPQ -- NUMBER OF QUEUE FOR CSA - ATP TRUCKS
C**** IND   -- INDEX FOR CURRENT AMMO SUPPLY BASE ON IATP DEFINITION
C**** LATP  -- ATP WITH LOWEST STOCK
C**** LEAST -- STOCK AT LATP
C
       NATP = IPARM(1)
       NUMSP = IPARM(2)
       NASP  = IATP(NATP,6) - 10
       ISTAT = IPARM(4)
C
       IF(NUMSP .EQ. 0)GO TO 10
       IF(ISTAT .EQ. 555)GO TO 3
C**** FIND THE MIX ON THE TRUCK
       MIX = ITRUCK(NUMSP, 5)
C      DETERMINE AMMO TYPE
C * * * NUMAM IS FOR IATP ARRAY == IAM IS FOR IMIX ARRAY
C * * * * * THE ABOVE DIFFER ONLY FOR FUZES (MIX 80)
       NUMAM = MIX - LPPAR(8)
       IAM = NUMAM
       IF(MIX .EQ. 80)NUMAM = 11
       IF(MIX.LE. 0) THEN
```

```
    2    FORMAT(' ATPAR1 -- ZERO MIX ON TRUCK ',I4)
         RETURN
      END IF
C
      LATP = NATP
C        IATPSD(4) = CFA ATP #
      IF(ISTAT .NE. 333 .OR. NATP .EQ. IATPSD(4))GO TO 3
C**** DETERMINE ATP DESTINATION (FROM DAO)
   70 IND = NUMAM * 3 + 18
C* * * AVAILABLE = ONHAND - DEMAND + ON-THE-WAY
      AVAIL = IATP(NATP,IND) - IATP(NATP,IND+1) + IATP(NATP,IND+2)
      LEAST = AVAIL
      IF (NUMAM .EQ. 9) GO TO 85
C *** IF AMMO AT PARENT IS LOW, SCHEDULE ARRIVAL TO IT
      IAMCK = IAMLVL(1,NUMAM) * .75
      IF(AVAIL .LT. IAMCK)GO TO 90
C *** FIND ATP WITH LEAST AMMO ON HAND
      IF(NATP .LE. 3)THEN
         JLOW = 1
         JHIGH = 3
      ELSE
         JLOW = 4
         JHIGH = 5
      END IF
      DO 80 J = JLOW,JHIGH
         AMAV = IATP(J,IND) - IATP(J,IND+1) + IATP(J,IND+2)
         IF(AMAV .GE. LEAST)GO TO 80
         LEAST = AMAV
         LATP = J
   80 CONTINUE
      IF(.7 * AVAIL .LT. LEAST)LATP = NATP
C
C * * * IF .GT., ATPS OVERSTOCKED, SEND S&P TO ASSC ASP
   85 IF(LEAST * 100 .GT. IAMLVL(1,29) * IAMLVL(1,NUMAM))THEN
         IF(IASP(NASP,2) .LT. 1) NASP = IASP(NASP,11)  - 10
         DIST = ABS(IATP(NATP,3) - IASP(NASP,1))
         ITYP = ITRUCK(NUMSP,1)
         TRTM = 60. * DIST / ITYPE(ITYP,IDAY+3)
         CALL OPERA(NUMSP,TRTM,TFAIL)
         IIPARM(1) = NASP + 10
         IIPARM(2) = NUMSP
         IIPARM(3) = 0
         IIPARM(4) = 444
         CALL SCHED(13,IPARM,TIME + TRTM + TFAIL)               @ ASPAR2
         WRITE(6,24)NUMSP,MIX,NASP+10,TIME
   24    FORMAT(' ATP S&P',I5,' MIX',I3,' DIVERTED TO ASP',I3,
     Z  ' AT TIME',F8.1)
         IASP(NASP,IND+2) =IASP(NASP,IND+2) + IMIX(MIX,IAM)
         RETURN
      END IF
C
      IF(NATP .NE. LATP)WRITE(6,26)NATP,NUMSP,MIX,LATP,TIME
   26 FORMAT(' ATP',I3,' S&P',I5,' MIX',I3,' DIVERTED TO ATP',I3,
     Z  'AT TIME',F8.1)
```

```
      IPARM(1) = LATP
   90 IPARM(4) = 0
      DIST = IATP(LATP,1) - IATP(LATP,3)
      ITYP = ITRUCK(NUMSP,1)
      TRTM = 60. * DIST / ITYPE(ITYP,IDAY+3)
      CALL OPERA(NUMSP,TRTM,TFAIL)
      TOTTIM = TIME + TRTM + TFAIL
      CALL SCHED(10,IPARM,TOTTIM)                                 @ ATPAR1
      IATP(LATP,NUMAM*3+20) = IATP(LATP,NUMAM*3+20) + IMIX(MIX,IAM)
      RETURN
C**** PUT TRUCK IN CSA-ATP AMMO QUEUE
    3 IF (TIME .GT. 1440. .AND. NATP .EQ. IATPSD(4) ) THEN
         NATP = 1
         LATP = 1
         GO TO 70
      END IF
      NATPQ = IQ(2, NATP)
      MTSP = NUMSP
      IF(ITRUCK(NUMSP,6) .LE. 0 .AND. IATP(NATP,5) .GT. 0)
     ZGO TO 30
      CALL PUTQUE(NUMSP, NATPQ)
      IF(ISTAT .EQ. 555)THEN
         ITRUCK(NUMSP,3) = TIME
         IF(ITRUCK(NUMSP,6) .GT. 0)ITRUCK(NUMSP,3) = 2
         RETURN
      END IF
C
C**** ADD AMMO TO THAT AVAILABLE  -  DECR ON-THE-WAY
      IND = NUMAM* 3 + 18
      IATP(NATP,IND) = IATP(NATP,IND) + (IMIX(MIX,IAM)
     Z * ITRUCK(NUMSP,6) + 9999)/10000
      IATP(NATP,IND+2) = IATP(NATP,IND+2) - (IMIX(MIX,IAM)
     Z * ITRUCK(NUMSP,6) + 9999)/10000
      IF(MIX. EQ. 80)GO TO 7
      IATPSP(NATP,NUMAM) = IATPSP(NATP,NUMAM) + 1
C
C**** UPDATE TRUCK STATUS TO THE CSA-ATP QUEUE
   7  IF(ITRUCK(NUMSP,3).GE.4)IATP(NATP,5)=IATP(NATP,5)+1
      ITRUCK(NUMSP, 3) = 2
      ITRUCK(NUMSP,10) = ITRUCK(NUMSP,10) + 1 @ # ARRIVALS FROM CSA
C****    CHECK QUE FOR EMPTY S & PS
C****      BRING FIRST S & P FROM QUEUE(MTSP)
  10  IF(IATP(NATP,5) .LE. 0)GO TO 50
      NATPQ = IQ(2,NATP)
      CALL GETQUE(MTSP,NATPQ)
C
C****      SEARCH FOR EMPTY S & P, STORE NCHTK AND PUT IT BACK
C****        IN QUEUE.
      NCHTK = MTSP
      IF(NCHTK .EQ. 0)GO TO 50
      CALL PUTQUE(MTSP,NATPQ)
   15 CALL GETQUE(MTSP,NATPQ)
C
C****     DETERMINE TRUCK LOAD
```

```
C           WRONG TRUCK, PUT BACK IN QUEUE
      CALL PUTQUE(MTSP,NATPQ)
C           IF LAST TRUCK,GO TO 50
      IF(MTSP .EQ. NCHTK)GO TO 50
      GO TO 15
C****       FOUND EMPTY TRUCK - SCHED CSA ARRIVAL
C             DETERMINE DISTANCE TO BE TRAVELED
   30 DIST = IATP(NATP,1)
      ITKTYP = ITRUCK(MTSP,1)
      TRTM = 60. * DIST/ITYPE(ITKTYP,IDAY+3)
      IF(ITRUCK(MTSP,3) .GT. 10)THEN
         NTIQ = TIME - ITRUCK(MTSP,3)
         ITRUCK(MTSP,13) = ITRUCK(MTSP,13) + NTIQ
      END IF
      ITRUCK(MTSP,3) = 4
C             INTERDICTION DELAY - TMIND
      CALL INTRDK(MTSP,TMIND)
      IF (TMIND .LE. 0.) THEN
C             COMPUTE DELAY DUE TO FAILURE - TFAIL
         CALL OPERA(MTSP,TRTM,TFAIL)
      ELSE
         TFAIL = 0.
      END IF
      TOTTIM = TRTM + TIME + TFAIL + TMIND + 20.
      IIPARM(1) = NATP
      IIPARM(2) = MTSP
      IIPARM(3) = IATP(NATP,6)
      IIPARM(4) = 0
C             ASSUME CSA - ATP TRUCK
      CALL SCHED(9,IIPARM,TOTTIM)                                @ CSAARV
      IATP(NATP,5) = IATP(NATP,5) - 1
      RETURN
C     NO EMPTY TRUCK FOUND SCHED FALSE EVENT
  50  IPARM(2) = 0
      CALL SCHED(10,IPARM,TIME + 30.)                            @ ATPAR1
C
      RETURN
      END
```

j. SUBROUTINE ATPAR2

```
      SUBROUTINE ATPAR2 (IPARM)
C**** EVENT ATPAR2  --  ARRIVAL OF S&P AT ATP FROM ASP (OR EMPTY FROM
C                       RELOADING IN ATP).
C                       FULL, PUT IN QUEUE: EMPTY, SEND TO ASP
C     EVENT TYPE 11
C     CALLED BY MAINARM
C     CALLS     IQ, PUTQUE, OPERA, INTRDK, SCHED
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- ATP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASSOCIATED ASP NUMBER
C**** IPARM(4) -- 555 : MEANS RETURN FROM RELOAD
C               OR MIX : (FROM ASPAR1) SERVICE OF ATP TO ASP S&P
C
C     SCHEDULES     ASPAR1, EMPTY S&P -> ASP
C     SCHEDULED BY  ASPAR1, ASPAR2, ATP
C
C**** PUTS TRUCK IN ASP-ATP QUEUE
C
C**** CHANGES       --  ATP AMMO SUPPLY.
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5),IIPARM(5)
C
C**** LOCAL VARIABLES
C**** MIX  -- MIX NUMBER OF AMMO CARRIED ON THE TRUCK
C**** NATPQ  -- NUMBER OF ATP QUEUE FOR LOADED AMMO TRUCKS
C**** IND    -- INDEX FOR CURRENT AMMO SUPPLY IN IATP.
C**** ISTAT  -- IPARM(4) MIX OR 555(RTN RELOAD)
C**** MTSP   -- TRUCK NUMBER OF AN EMPTY S&P -> ASPAR1
C
      NATP = IPARM(1)
      NUMSP = IPARM(2)
      ISTAT = IPARM(4)
C
      IF(ISTAT .EQ. 555)GO TO 3
C**** FIND MIX NUMBER ON TRUCK
      MIX = ITRUCK(NUMSP, 5)
      IF(MIX .LE. 0) THEN
         WRITE(6,2) NUMSP
    2    FORMAT(' ATPAR2 -- ZERO MIX ON TRUCK ',I4)
         RETURN
      END IF
C
C**** PUT TRUCK IN ATP AMMO TRUCK QUEUE
  3   IF(ITRUCK(NUMSP,6) .LE. 0)THEN
         MTSP = NUMSP
         GO TO 30
      END IF
      NATPQ = IQ(3,NATP)
      CALL PUTQUE (NUMSP, NATPQ)
```

```
C
C**** ADD AMMO TO AMMO AVIALABLE  -  DECR ON-THE-WAY
C * * * NUMAM IS FOR IATP ARRAY == IAM IS FOR IMIX ARRAY
C * * * * * THE ABOVE DIFFER ONLY FOR FUZES (MIX 80)
      NUMAM = MIX - LPPAR(8)
      IAM = NUMAM
      IF(MIX .EQ. 80)NUMAM = 11
      IND = NUMAM * 3 + 18                 @ ON HAND
      IATP(NATP,IND) = IATP(NATP,IND) + (IMIX(MIX,IAM) * ITRUCK
     Z    (NUMSP,6) + 9999) / 10000
      IATP(NATP,IND+2) = IATP(NATP,IND+2) - (IMIX(MIX,IAM) * ITRUCK
     Z    (NUMSP,6) + 9999) / 10000            @ ON-THE-WAY
      IATPSP(NATP,NUMAM+11) = IATPSP(NATP,NUMAM+11) + 1
C
C**** UPDATE TRUCK STATUS TO BEING IN THE ATP QUEUE
C     IF(ITRUCK(NUMSP,3).EQ.4)IATP(NATP,5)=IATP(NATP,5)+1
      ITRUCK(NUMSP, 3) = 2
      ITRUCK(NUMSP,10) = ITRUCK(NUMSP,10) + 1 @ # ARRIVALS FROM ASP
C
      RETURN
C
C****    HAVE FOUND EMPTY TRUCK - SCHED ASP ARRIVAL
C          DETERMINE DIST TO BE TRAVELED
   30 DIST = IATP(NATP,2)
      ITKTYP = ITRUCK(MTSP,1)
      TRTM = 60. * DIST / ITYPE(ITKTYP,IDAY+3)
      ITRUCK(MTSP,3) = 4
C            COMPUTE INTERDICTION DELAY - TMIND
      CALL INTRDK(MTSP,TMIND)
      IF(TMIND .LE. 0.) THEN
C            COMPUTE DELAY DUE TO FAILURE - TFAIL
         CALL OPERA(MTSP, TRTM, TFAIL)
      ELSE
         TFAIL = 0.
      END IF
      TOTTIM = TRTM + TIME + TFAIL + TMIND + 20.
      IIPARM(1) = NATP
      IIPARM(2) = MTSP
      IIPARM(3) = IATP(NATP,6)
C          ASSUME ASP - ATP TRUCK
      CALL SCHED(12,IIPARM,TOTTIM)            @ ASPAR1
C
      RETURN
      END
```

k.   SUBROUTINE CONTRL

```
         SUBROUTINE CONTRL (TIME)
C        EVENT TYPE 19
C        CALLED BY MAINARM, INIT, SCHED
C        CALLS      EDITD, REPORT, SCHED, CREEVT
C
C**** ALLOWS INTERACTIVE CONTROL FOR DATA EDITING AND REPORTS
C**** ALLOWS SCHEDULING OF NEXT CONTRL TIME.
C**** H. JONES     FEB 79
C
C        SCHEDULES   CONTRL, ENDSIM
C        SCHEDULED BY CONTRL
         DIMENSION IPARM(5)
   10       WRITE(6,20) TIME
   15       FORMAT(' (1) - EDIT DATA ',/,
     Z      ' (2) - WRITE REPORT ',/,
     Z      ' (3) - SCHEDULE CONTROL ',/,
     Z      ' (4) - RETURN ',/,
     Z      ' (5) - STOP SIMULATION NOW ',/,
     Z      ' (6) - EDIT TRUCK QUEUES ',/,
     Z      ' (7) - CREATE EVENTS')
   20       FORMAT(' TIME = ',F8.2,/,'  ?')
         READ(5,*,ERR=25) IOPT
         IF(IOPT .LT. 1 .OR. IOPT .GT. 7) GO TO 25
         GO TO (30, 40, 50, 70, 60, 65, 68), IOPT
  25     WRITE(6,15)
         GO TO 10
C**** EDIT DATA
   30 CALL EDITD
         GO TO 10
C
C**** WRITE REPORT
  40  CALL REPORT (9)
         GO TO 10
C
C**** SCHEDULE CONTROL
   50 WRITE(6,55)
   55 FORMAT(' ENTER TIME FOR NEXT CONTROL    ')
         READ(5,*) TNEXT
         CALL SCHED (19, IPARM, TNEXT)              @ CONTRL
         GO TO 10
C
C**** EDIT TRUCK QUEUES
   65 CALL TRKPUT
         GO TO 10
C
C**** CREATE EVENTS
   68 CALL CREEVT
         GO TO 10
C
C**** STOP SIMULATION.
   60 IPARM(1) = 9999
         IPARM(2) = 9999
         IPARM(3) = 9999
   CALL SCHED (19, IPARM, TIME - .1)          @ ENDSIM
70 RETURN
   END
```

1.   SUBROUTINE CREEVT

```
      SUBROUTINE CREEVT
C**** ENABLES INTERACTIVE CREATION OF EVENTS SUCH AS TRUCKS
C**** TO ARRIVE AT AN ATP FROM THE CSA IN MID-CI.
C
C        CALLED FROM ARM MENU(CONTRL)
C        CALLS  READF  TO GET VALUES FROM THE KEYBOARD
C               SCHED TO SCHEDULE THE CREATED EVENT
C**** JAMES FOX ESQ. DDT. TNT. MARCH NINETEEN HUNDRED AND SEVENTY NINE
C
C**** LOCAL VARIABLE DEFINITION
C**** IPARM - CONTAINS THE 5 PARAMETERS OF THE EVENT
C**** INTGR -  '    '  UP TO 6 INTEGER VALUES FROM THE CONSOLE
C**** IWORD -  '    '  UP TO 6 ALPHA VALUES FROM THE CONSOLE
C**** REAL  -  '    '  UP TO 6 REAL VALUES FROM THE CONSOLE
C**** IEND  -  '    '  END OF INPUT CHECK
C**** TOTIM - TIME OF SCHEDULED EVENT
C**** ITYP  - EVENT TYPE
C**** IPARM(1) - UNIT/ATP/ASP NO.
C**** IPARM(2) - TRUCK NO.
C
      CHARACTER*10 IWORD,IHELP,IEND
      DIMENSION IPARM(5),INTGR(6),IWORD(6),REAL(6)
      DATA IHELP /'HELP'/
      DATA IEND /'END'/
C
    5 WRITE(6,100)
      LU1 = 5
   10 WRITE(6,150)
  150 FORMAT(/,1X,' ?  ')
      CALL READF(LU1,6,INTGR,REAL,IWORD)
C**** IF END OF INPUT RETURN (200)
      IF(IWORD(1).EQ.IEND) GO TO 200
      IF(IWORD(1).EQ.IHELP) GO TO 5
C**** LOAD EVENT TYPE, PARAMETERS, AND TIME
      ITYP = INTGR(1)
      IF(ITYP.LE.0.OR.ITYP.GT.17) GO TO 10
      DO 20 I = 1,5
         IPARM(I) = INTGR(I+1)
   20 CONTINUE
      TOTIM = REAL(1)
      CALL SCHED(ITYP,IPARM,TOTIM)
      GO TO 10
C
  100 FORMAT(' TO CREATE AN EVENT, INPUT AS A GROUP SEPARATED BY',/,
     Z     ' COMMAS OR SPACES THE FOLLOWING 7 VALUES ',/,
     Z     ' EVENT TYPE (INTEGER VALUES BETWEEN 1 AND 17).',/,
     Z     ' 5 PARAMETERS FOR EACH EVENT(INTEGER,DEPEND ON EVENT TYPE',/,
     Z     ' AND TIME (DECIMAL MINUTES, REAL).',/,
     Z     ' EXAMPLE: 10,1,512,0,0,0,305.',/,
     Z     ' CSA-TO-ATP TRUCK 512 WILL ARRIVE AT ATP AT TIME = 305 MIN'/)
  200 RETURN
      END
```

m. SUBROUTINE CSAARV

```
      SUBROUTINE CSAARV (IPARM)
C**** EVENT CSAARV --  ARRIVAL OF S&P TRUCK AT CSA
C                      TRUCK IS SERVICED FROM CSA STOCK & SENT FWD
C         EVENT TYPE 9
C
C**** LARRY TOLIN     AUG 82
C
C**** IPARM(1) -- ATP NUMBER OR ASP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- ASSOCIATED ASP NUMBER
C**** IPARM(4) --  '1'  FLAG FOR INITIAL REPLENISHMENT TRIP
C                (OTHERWISE 30 MIN. HITCH/UNHITCH TIME)
C             --  '-1'  FLAG TO PUT S&P INTO CSA QUEUE
C
C     CALLED BY MAINARM
C     CALLS     PUTQUE, SCHED, GETQUE
C
C**** SCHEDULES    --  CSADEP -- UNLESS STOCKAGE OBJECTIVE IS MET AT ASPS
C     SCHEDULED BY ASPAR2, ATPAR1
C
C**** CHANGES      --  CSA AMMO SUPPLY.
C     LOCAL VARIABLES
C        HITCH    -- TIME TO HITCH UP THE S&P
C        INITL    -- IPARM(4), INITIAL REPLEN TRIP, 1=YES
C     THESE VARS ARE USED TO FIND MIX TO GET:
C        AMCODE   -- LOOP TO FIND WORST NEEDED TYPE
C        AMPCT    -- LEAST % SO FAR
C        ASPPCT   -- % AT NUMASP
C        NLASP    -- ASP WITH ASPPCT
C        NUMASP   -- ASP THAT THE S&P WILL GO TO
C        PCT      -- PERCENT OF AMCODE AT ASP
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
      INTEGER AMCODE,ASP
C
      INITL = IPARM(4)
      IF(INITL .EQ. 1)THEN
         HITCH = 0.
      ELSE
         HITCH = 30.
      END IF
C
      NUMSP = IPARM(2)
      ITRUCK(NUMSP,3) = 8
C * * * * TO MAKE THE 'TMO' DECISION PROCESS INTERACTIVE FOR
C        SCHEDULING CONVOYS TO EITHER ASPS AND/OR ATPS. CHANGE THE
C        SETTING OF 'IPARM(4)' TO '-1' IN ASPAR2 AND/OR ATPAR1,
C        RESPECTIVELY
C
C        THEN SCHEDULE S&PS (USING SSG ADDEVTSARM) WITH 'IPARM(4)'
C        EQUAL TO '1'
```

```
      IF(INITL .EQ. -1)THEN
         CALL PUTQUE(NUMSP,176)
         RETURN
      END IF
C
      IF(ITRUCK(NUMSP,4) .GT. 85)GO TO 10
C
C * * * ATP S&P, SET CORRECT ATP # AND SCHEDULE TO CSADEP
      IF(ITRUCK(NUMSP,4) .NE. IATPSD(4) + 75)THEN @ (4) IS CFA ATP #
   3     NATP = ITRUCK(NUMSP,4) - 75
         IF(NATP .NE. IPARM(1))THEN
            WRITE(6,5)NUMSP,NATP,IPARM(1),TIME
   5        FORMAT(' ATP S&P',I5,' REASSIGNED TO PARENT ATP',I2,
     $        ' FROM ASP/ATP',I3,' TIME',F8.1)
            END IF
         NASP = IATP(NATP,6)
         IPARM(1) = NATP
         IPARM(3) = MIX
         IPARM(4) = 0
         CALL SCHED(16,IPARM,TIME + HITCH)      @CSADEP
         MIXAM = ITRUCK(NUMSP,5) - LPPAR(8)
         ICSA(1,MIXAM) = ICSA(1,MIXAM) + 1 @ INCR CSA-ATP AMMO ISSUED
         RETURN
      END IF
C
C * * * CFA ATP S&PS -- PUT IN QUE
      IF(INITL .EQ. 1)GO TO 3
      CALL PUTQUE(NUMSP,176)
      ITRUCK(NUMSP,3) = TIME
      RETURN
C
C * * * ASP S&P, CHECK RECEIVING ASPS FOR GREATEST AMMO TYPE NEEDED
   10 IF(INITL .EQ. 1)GO TO 35 @ INITIAL REPLENISHMENT FOR THIS S&P
C *   * LOOP THROUGH ALL RECEIVING ASPS (STATUS = 1)
C
      ASPPCT = 100.
      DO 20 AMCODE = 1,LPPAR(1)
         IF(IAMLVL(2,AMCODE) .EQ. 0)GO TO 20
         AMPCT = 100.
         DO 30 ASP = 1,10
            IF(IASP(ASP,2) .NE. 1)GO TO 30
C * *         ASPPCT = (ONHAND - DEMAND + ON-THE-WAY)/STOCKAGE OBJECTIVE
            PCT = (IASP(ASP,AMCODE*3+18) - IASP(ASP,AMCODE*3+19) +
     $        IASP(ASP,AMCODE*3+20))/IAMLVL(2,AMCODE)
            IF(PCT .LT. AMPCT)THEN
               AMPCT = PCT
               NLASP = ASP
            END IF
   30    CONTINUE
         IF(AMPCT .LT. ASPPCT)THEN
            ASPPCT = AMPCT
            NUMASP = NLASP
            MIXAM = AMCODE
         END IF
```

```
C * * * IF ASPPCT .GT. ASP S O, PUT S&P IN CSA QUEUE
      IASPCT = ASPPCT
      IF(IASPCT .GT. IAMLVL(1,30))THEN
         CALL PUTQUE(NUMSP,176)
         ITRUCK(NUMSP,3) = TIME
         ICSA(2,31) = ICSA(2,31) + 1      @ INCR CSA EMPTY S&P CNTR
         RETURN
      END IF
C
C * * * PREPARE S & P FOR CSADEP
      ITRUCK(NUMSP,4) = NUMASP + 125
      MIX = MIXAM + 60
      ITRUCK(NUMSP,5) = MIX
      ITRUCK(NUMSP,6) = 10000
      IPARM(1) = NUMASP + 10
      IPARM(3) = MIX
  35  IPARM(4) = 0
      CALL SCHED(16,IPARM,TIME + HITCH)        @ CSADEP
C
C * * * INCR AMMO ISSUED AT CSA BY ONE S&P LOAD
      IF(INITL .EQ. 1)THEN
         MIXAM = ITRUCK(NUMSP,5) - LPPAR(8)
         NUMASP = IPARM(1) - 10
         MIX = ITRUCK(NUMSP,5)
      END IF
      ICSA(2,MIXAM) = ICSA(2,MIXAM) + 1
C * * * INCR ROUNDS ON-THE-WAY AT ASP
      IASP(NUMASP,MIXAM * 3 + 20) = IASP(NUMASP,MIXAM * 3 + 20) +
     $        IMIX(MIX,MIXAM)
C * * * CHECK QUEUE FOR EMPTY S&PS
      IF(ICSA(2,31) .LE. 0)RETURN
      CALL GETQUE(NUMSP,176)
      ICKSP = NUMSP
      CALL PUTQUE(NUMSP,176)
      CALL GETQUE(NUMSP,176)
      IF(ITRUCK(NUMSP,6) .EQ. 0)THEN
         ICSA(2,31) = ICSA(2,31) - 1      @ DECR CSA EMPTY S&P COUNTER
         GO TO 10
      ELSE
         CALL PUTQUE(NUMSP,176)                @ CSA S&P QUEUE
         IF(ICKSP .EQ. NUMSP)THEN
            ICSA(2,31) = 0
            RETURN
         END IF
      END IF
      STOP ' CSAARV '
      END
```

n.   SUBROUTINE CSADEP

```
      SUBROUTINF CSADEP (IPARM)
C     EVENT TYPE 16
C**** EVENT CSADEP --  DEPARTURF OF TRUCK FROM CSA
C     ATP USFS CONVOYS OF 3 TRUCKS EACH, ASP USES CONVOYS OF 7 TRUCKS
C     EACH.  TRUCKS ARE SCHFDULED 1 MINUTE APART.
C
C     CALLED BY MAINARM
C     CALLS     OPERA, INTRDK, SCHED, PUTQUE, GETQUE
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- ATP NUMBER OR ASP NUMBER
C**** IPARM(2) -- TRUCK NUMBER
C**** IPARM(3) -- MIX
C**** IPARM(4) --
C
C**** SCHEDULES    --  ATPAR1, ARRIVAL OF TRUCK AT ATP
C                  --  ASPAR2, ARRIVAL OF TRUCK AT ASP
C
C     SCHEDULED BY CSAARV
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5),ISPQ(10)
      INTEGER OWNER
C
C**** LOCAL VARIABLES :
C**** LDTIM  -- TIME TO LOAD TRUCK
C**** DIST   -- DIST BACK TO ASP OR ATP
C**** TVLTIM -- TRAVEL TIME
C**** ITKTYP -- TRUCK TYPE
C**** TS     -- (TIMF) SPACE BETWEEN TRUCKS IN A CONVOY
C**** INCONV -- NUMBER OF TRUCKS IN A CONVOY
C**** NSPCK  -- CHECK TRUCK FOR S&P S
C**** TFAIL  -- DELAY ENROUTE DUE TO FAILURE
C**** TOTTIM -- TIME OF ARRIVAL OF TRUCK BACK TO ATP
C**** ISPQ() -- S&P S AWAITING CONVOY
C**** TMIND  -- INTERDICTION TIME DELAY
C
      NUMSP = IPARM(2)
      ITRUCK(NUMSP,3) = TIME
      IF(IPARM(1) .GT.10)GO TO 100
C **********  ATP S&P  ***********
C
      NATP = IPARM(1)
C
      IF(NATP .EQ. IATPSD(4))THEN   @ CFA ATP
         MIX = ITRUCK(NUMSP,5)
         NUMAM = MIX - LPPAR(3)
         IATP(NATP,NUMAM * 3 + 20) = IATP(NATP,NUMAM * 3 + 20)
     $          + IMIX(MIX,NUMAM)  @ ON-THE-WAY TO CFA ATP
         DIST = IATP(NATP,1)
         ITKTYP = ITRUCK(NUMSP,1)
```

```
            ITRUCK(NUMSP,3) = 4
            CALL INTRDK(NUMSP,TMIND)
            IF(TMIND.EQ.0.)CALL OPERA(NUMSP,TVLTIM,TFAIL)
            TOTIM = TIME + TVLTIM + TFAIL + TMIND
            IPARM(4) = ITRUCK(NUMSP,5)
            CALL SCHED(10,IPARM,TOTIM)            @ ATPAR1
            RETURN
         END IF
C
C * * * INCREMENT ATP S&P COUNTER
C
         CALL PUTQUE(NUMSP,176)
         IATP(NATP,13) = IATP(NATP,13) + 1
         IF(IATP(NATP,13) .LT. 3)RETURN
C
C * * * THREE S&PS AVAILABLE FOR CONVOY
C
         IATP(NATP,13) = IATP(NATP,13) - 3 @ DCRMT ATP S&P CONVOY COUNTER
         IATP(NATP,17) = IATP(NATP,17) + 1 @ INCR # OF CONVOYS CNTR
C
         DIST = IATP(NATP,3)
         INCONV = 3
         IEVTYP = 10
         IPARM(1) = NATP
         IPARM(4) = 333
         IF(NATP. EQ. IATPSD(4))IPARM(4) = 0
         OWNER = NATP + 75
         GO TO 20
C
C   *********  ASP S&P  **************
C
C * * * INCR ASP S&P CONVOY CNTR
C
   100 NASP = IPARM(1) - 10
         CALL PUTQUE(NUMSP,176)
         IASP(NASP,14) = IASP(NASP,14) + 1
         IF(IASP(NASP,14) .LT. 7)RETURN
C * * * SEVEN S&PS AVAILABLE FOR CONVOY
C
         IASP(NASP,14) = IASP(NASP,14) - 7
         IASP(NASP,17) = IASP(NASP,17) + 1
         DIST = IASP(NASP,1)
         INCONV = 7
         IEVTYP = 13
         IPARM(1) = NASP + 10
         IPARM(4) = 0
         OWNER = NASP + 175
C
C * * MOVE S&PS FROM CSA QUEUQ TO CONVOY (ISPQ) QUEUE
   20    DO 3 JJ = 1,10
            ISPQ(JJ) = 0
  3      CONTINUE
         CALL GETQUE(NUMSP,176)
         KOUNT=1
```

```
      NSPCK=NUMSP
      CALL PUTQUE(NSPCK,176)
   13 CALL GETQUE(NUMSP,176)
      IF(ITRUCK(NUMSP,4).EQ.OWNER)THEN
         ISPQ(KOUNT)=NUMSP
         IF(NUMSP.EQ.NSPCK)GO TO 11
         IF(KOUNT .EQ. INCONV)GO TO 11
         KOUNT=KOUNT + 1
         GO TO 13
      ELSE
         CALL PUTQUE(NUMSP,176)
         IF(NUMSP.EQ.NSPCK)GO TO 11
         GO TO 13
      END IF
C
C*********HAVE ALL TRAILERS,FIND DISTANCE AND SCHEDULE
   11 ITKTYP = ITRUCK(NUMSP,1)
      TVLTIM = 60.*DIST/ITYPE(ITKTYP,IDAY+3)
      TS = 1.
      DO 12 JJ = 1,KOUNT
      NUMSP = ISPQ(JJ)
      NTIQ = TIME - ITRUCK(NUMSP,3)
      ITRUCK(NUMSP,12) = ITRUCK(NUMSP,12)+ NTIQ
      ITRUCK(NUMSP,11) = ITRUCK(NUMSP,11) + 1      @ # TIMES AT CSA
      ITRUCK(NUMSP,3) = 4
      TFAIL = 0.
      CALL INTRDK(NUMSP,TMIND)
      IF(TMIND.EQ.0.)CALL OPERA(NUMSP,TVLTIM,TFAIL)
      TOTIM = TVLTIM + TIME + TFAIL + TMIND + TS
      IPARM(2) = NUMSP
      IPARM(3) = ITRUCK(NUMSP,5)
      CALL SCHED(IEVTYP,IPARM,TOTIM)           @ ATPAR1/ASPAR2
      TS=TS+1.
12    CONTINUE
      RETURN
      END
```

O.   SUBROUTINE DEMAND

```
      SUBROUTINE DEMAND (IPARM)
C**** EVENT DEMAND --  CHECKS AMMO DEMAND OF UNITS.  RFLOAD IF NECESSARY.
C     EVENT TYPE 1
C     CALLED BY MAINARM
C     CALLS     RDIEXO(SCHEDULES NEXT DFMAND), SCHED, OPERA
C
C**** D. HILLIS  JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C
C**** SCHEDULES -- RELOAD, RESUPPLY OF UNITS.
C                  HELARV, ARRIVAL OF HELICOPTER AT UNIT
C                  HASPAR, HELI RETURN (FAILED IN ROUTE)
C     SCHEDULED BY RDIEXO, RDJIFF(READS DEMAND FILE)
C
C**** LOCAL VARIABLE DEFINITIONS
C**** K - UNIT AMMO INDEX
C**** NFLAG - 0  RELOAD NOT SCHEDULED YET. 1 RELOAD ALREADY SCHFDULED
C**** IFLAG - 0  NORMAL MODE.  1 - 155 HE OR ICM AMMO BELOW CRL
C**** I - UNIT NUMBER
C**** IA - LOOP INDEX
C**** II - LOOP INDEX
C**** TVLTIM - ROAD TRAVEL TIME
C**** TFAIL - TIME LOST DUE TO REMEDIAL MAINTENANCE
C**** TOTIM - TIME TO SCHEDULE THE EVENT
C**** IRRL - ROUTINE RESUPPLY LEVEL FOR LIVE WPNS
C**** IBAM - BASIC AMMO LEVEL FOR LIVE WPNS
C**** IRGND - NO. RNDS ON GROUND AT FARP
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
      NUNIT = IPARM(1)
      NASP = IUNIT(NUNIT,3) - 10
C
      CALL RDIEXO(NUNIT)
C     INITIALIZE FLAGS AND COUNTERS
      IFLAG = 0
      NFLAG = 0
C**** SELECT AN AMMO TYPE
C
      DO 100 KK = 1,LPPAR(6)
      K = KK * 13 - 5
      IF(IUNIT(NUNIT,K).EQ.0) GO TO 100
      IBAM=IUNIT(NUNIT,K+1)*IUNIT(NUNIT,K+7)
C**** CHECK FOR A FARP
      IF(IUNIT(NUNIT,1).EQ.8) GO TO 50
      IF(IBAM-IUNIT(NUNIT,K+4).EQ.0) GO TO 100
C**** CHECK FOR ROUTINE RESUPPLY
      IRRL=IUNIT(NUNIT,K+1)*IUNIT(NUNIT,K+5)
      IF(IUNIT(NUNIT,K+4).GT.IRRL) GO TO 100
      L = IUNIT(NUNIT,K)
C
```

```
      IF(IUNIT(NUNIT,1).EQ.4) THEN
C**** CHECK FOR AMMO TYPES 4 AND 5
       IF(IUNIT(NUNIT,K) .EQ. 4 .OR. IUNIT(NUNIT,K) .EQ. 5) THEN
C****    CHECK TO SEE IF CURRENT AMMO SUPPLY GT CRITICAL RESUP LEVEL
        IF(IUNIT(NUNIT,K+4).GT.IUNIT(NUNIT,K+6)*IUNIT(NUNIT,K+1))GOTO35
         IFLAG = 1
       END IF
      END IF
C
C**** IS THERE AMMO OF THIS TYPE ON TRUCKS
   35 IF(IUNIT(NUNIT,K+8) .GT. 0) THEN
C          THERE IS AMMO ON A TRUCK
         IF(IFLAG .EQ. 1)GO TO 110
         IF(NFLAG .EQ. 1)GO TO 100
C        SCHEDULE RELOAD IMMEDIATELY
         CALL SCHED(2,IPARM,TIME)                @ RELOAD
         NFLAG = 1
      ELSE
         IF(IFLAG .EQ. 1)GO TO 150
      END IF
      GO TO 100
C**** DETERMINE AMMO REQUIREMENT AT FARP
 50   IRGND=(IUNIT(NUNIT,K+4)-IBAM) + IUNIT(NUNIT,K+3)  @ CUR CAP + SHRT
      IF(IRGND .LE. 0)IRGND = 0
      IF(IUNIT(NUNIT,K+3).GT.IRGND) THEN
         IUNIT(NUNIT,K+3)=IUNIT(NUNIT,K+3)-IRGND
         IRGND = 0
         IUNIT(NUNIT,K+4)=IBAM-IUNIT(NUNIT,K+3)
         WRITE(LUOUT,210) IUNIT(NUNIT,K+4),IRGND
         GO TO 35
      END IF
      IRGND=IRGND-IUNIT(NUNIT,K+3)
      IUNIT(NUNIT,K+4)=IRGND+IBAM
      IUNIT(NUNIT,K+3)=0
      IUNIT(NUNIT,K+2) = 0
      WRITE(LUOUT,210) IUNIT(NUNIT,K+4),IRGND
 210  FORMAT(' DMD - FARP O/H= ',I5,' ON GRND= ',I5)
      GO TO 100
C**** COMPARE AVAILABLE AMMO AGAINST CRL
  110 IF(IUNIT(NUNIT,K+8)+IUNIT(NUNIT,K+4).GT.IUNIT(NUNIT,K+6)*
     Z       IUNIT(NUNIT,K+1)) THEN
         IF(NFLAG .NE. 1) THEN
            CALL SCHED(2,IPARM,TIME)             @ RELOAD
            NFLAG = 1
         END IF
         IFLAG = 0
         GO TO 100
      END IF
      IF(NFLAG .EQ. 1)GO TO 150
      CALL SCHED(2,IPARM,TIME)                   @ RELOAD
      NFLAG = 1
C**** HELICOPTER RESUPPLY LOGIC
C**** DOES UNIT ALREADY HAVE MAX NUMBER OF HELICOPTERS ASSIGNED
  150 IF(IUNIT(NUNIT,138) .EQ. 2)GO TO 170
```

```
      IF(IUNIT(NUNIT,138) .EQ. 1)GO TO 160
      WRITE(LUOUT,155)TIME
  155 FORMAT('  AT ',F8.2,'  MIN.  NO HELICOPTERS AVAILABLE ')
C
      GO TO 170
  160 WRITE(LUOUT,165)TIME
  165 FORMAT('  AT ',F8.2,' MIN. HELI SCHEDULED, NO OTHERS AVAIL. ')
  170 IF(NFLAG .EQ. 1)GO TO 200
      IFLAG = 0
      GO TO 100
  180 LPPAR(5) = LPPAR(5) - 1
C     FIND AVAILABLE HELI(MISSION = 5, STATUS = 3)
      DO 185 II = 1,LPPAR(4)
         IF(ITRUCK(II,2) .NE. 5)GO TO 185
         IF(ITRUCK(II,3) .EQ. 6)GO TO 185
         IF(ITRUCK(II,3) .EQ. 3)GO TO 175
  185 CONTINUE
      WRITE(LUOUT,186)
  186 FORMAT('  CANNOT FIND THE AVAIL HELICOPTER-DEMAND ')
      GO TO 200
C     HAVE HELICOPTER II UPDATE STATUS
  175 ITRUCK(II,3) = 4
      ITRUCK(II,9) = ITRUCK(II,9) + 1  @ HELI TRIP COUNTER
C     SCHEDULE ARRIVAL AT UNIT
      IPARM(2) = II
C     FIND TRAVEL TIME TVLTIM
      TVLTIM = 60. * IUNIT(NUNIT,5) / ITYPE(6,IDAY+1)
      CALL OPERA(II,TVLTIM,TFAIL)
      MIX=ITRUCK(II,5)
      TOTIM = TIME + TVLTIM + TFAIL + IMIX(MIX,32)
C *** INCREMENT ASP AMMO ISSUED BY ONE HELI LOAD
      IASPAM(NASP,90) = IASPAM(NASP,90) + 1
C *** DECREMENT AMMO ON HAND AT ASP
      DO 187 IA = 1,LPPAR(1)
      IASP(NASP,IA * 3 + 18) = IASP(NASP,IA * 3 + 18) - IMIX(MIX,IA)
  187 CONTINUE
C**** IF HELICOPTER FAILS IN ROUTE TO UNIT
C     SEND ANOTHER HELICOPTER, IF AVAILABLE
C     SCHED HELASP
C     SET STATUS AS DOWN
      IF(TFAIL .LE. 0)GO TO 188
      ITRUCK(II,3)=6
      CALL SCHED(15,IPARM,TOTIM)                @ HASPAR
      GO TO 190
  188 IUNIT(NUNIT,138) = IUNIT(NUNIT,138) + 1
C***
      CALL SCHED(14,IPARM,TOTIM)                @ HELARV
      IASP(NASP,15) = IASP(NASP,15) + 1
      IASP(NASP,3) = IASP(NASP,3) + 1
      IF(IUNIT(NUNIT,138) .EQ. 2)GO TO 170
C**** MIX 91 IS FOR THE CH47 HELICOPTER
      IF(IMIX(91,L)+IUNIT(NUNIT,K+4).GT.IUNIT(NUNIT,K+6)*IUNIT(NUNIT,
     $      K+1)) GO TO 170
      GO TO 190
```

```
200 RETURN
    END
```

p. SUBROUTINE DEPASP

```
      SUBROUTINE DEPASP(IPARM)
C**** ROUTINE DEPASP REMOVES A MLRS TRUCK FROM SERVICE AT THE ASP. IT
C**** CHECKS FOR A MLRS TRUCK IN THE WAIT QUEUE AND SCHEDULES AN ASP
C**** EVENT IMMEDIATELY IF ONE IS FOUND.
C
C     CALLED BY UNTARV
C     CALLS     GETQUE, SCHED, PUTQUE
C     SCHEDULES ASP, ATP
C
C**** L. IVERSON DEC 81
C
C**** LOCAL VARIABLES
C     NUMQ  -- THE QUEUE NUMBER FOR MLRS TRUCKS WAITING SERVICE
C     NUMTK -- THE TRUCK NUMBER OF THE TRUCK FOUND IN NUMQ
C     NCHTK -- CHECK TRUCK FOR FIRST TRUCK IN QUEUE
C
C**** IPARM(1) = ASP/ATP NUMBER
C**** IPARM(2) = 0  -- FLAG THAT IT IS A MLRS TRUCK LEAVING THE ASP
C****          = -1 -- FLAG THAT IT IS A MLRS TRUCK LEAVING THE ATP
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
C**** REMOVE THE TRUCK FROM ASP SERVICE
      IF(IPARM(2) .EQ. -1) GO TO 10
      NASP = IPARM(1) - 10
      IASP(NASP,8) = IASP(NASP,8) - 1
C
C * * * * IF ASP INTERDICTED, DO NOT SCHEDULE MLRS SERVICE
      IF((NASP + 10) .EQ. ISERV(6))RETURN
C
C**** CHECK FOR ANOTHER MLRS TRUCK TO LOAD
      NUMQ = IASP(NASP,10)
      CALL GETQUE(NUMTK,NUMQ)
C**** IF A TRUCK IS FOUND SCHEDULE EVENT ASP
      IF(NUMTK .EQ. 0) RETURN
      IPARM(1) = 2
      IPARM(2) = NASP + 10
      IPARM(3) = NUMTK
      IPARM(4) = NUMTK
      CALL SCHED(7,IPARM,TIME)                  @ ASP
C**** ADD ONE TO THE NUMBER OF MLRS TRUCKS BEING SERVED
      IASP(NASP,8) = IASP(NASP,8) + 1
      RETURN
C
C
C         ELSE MUST BE AN ATP
C
   10 NATP = IPARM(1)
      IATP(NATP,8) = IATP(NATP,8) - 1
      IF(IATP(NATP,8) .LT. 0)PRINT*,'DEPASP  ',NATP,IATP(NATP,8),TIME
C
C * * * * IF ATP INTERDICTED, DO NOT SCHEDULE MLRS SERVICE
```

```
C
      NUMQ = IATP(NATP,11)
      CALL GETQUE(NUMTK,NUMQ)
C**** SEARCH FOR RIGHT TRUCK
C     IF QUEUE IS EMPTY RETURN
      IF (NUMTK .EQ. 0) RETURN
      NCHTK = NUMTK
      CALL PUTQUE(NUMTK,NUMQ)
  12  CALL GETQUE(NUMTK,NUMQ)
C     DETERMINE MIX ON TRUCK
      MIX = ITRUCK(NUMTK,5)
      IF (MIX .EQ. 10 .OR. MIX .EQ. 40) GO TO 15
C     WRONG TRUCK PUT BACK IN QUEUE
      CALL PUTQUE(NUMTK,NUMQ)
C     IF LAST TRUCK, RETURN
      IF (NUMTK .EQ. NCHTK) RETURN
      GO TO 12
C
   15 IPARM(1) = 1
      IPARM(2) = NATP
      IPARM(3) = NUMTK
      IPARM(4) = NUMTK
      CALL SCHED(6,IPARM,TIME)                @ ATP
C**** ADD ONE TO THE NUMBER OF MLRS TRUCKS BEING SERVED
      IATP(NATP,8)= IATP(NATP,8) + 1
C
   20 RETURN
      END
```

q.

```
     SUBROUTINE DUALMX
      SUBROUTINE DUALMX(I,K,J)
C
C      RELOADS MORTARS AND BUSHMASTERS FROM THE SAME TRUCK UNTIL BOTH
C      ARE FILLED OR THE TRUCKS RUN OUT OF AMMO. THE SAME PERCENTAGE
C      OF ROUNDS WILL BE GIVEN TO EACH SYSTEM DURING THE RELOAD.
C      CALLED BY RELOAD
C      CALLS     IQ, FINTK, INTRDK, SCHED
C
C     SCHEDULES ASPARV, DEAD TRUCK -> ASP
C               UNTDEP, RETURNS UNIT TRUCK
C               UNTARV,       ''
C
C**** L. IVERSON NOV 81
C
C**** LOCAL VARIABLES
C      I      -- UNIT NUMBER
C      K      -- UNIT ARRTIBUTE FOR MORTAR AMMUNITION
C      J      -- THE UNIT ATTRIBUTE FOR BUSHMASTER AMMUNITION
C      NDMORT -- THE NUMBER OF ROUNDS SHORT OF MORTAR AMMO
C      NDBUSH -- THE NUMBER OF ROUNDS SHORT OF BUSHMASTER AMMO
C      RPMORT -- THE PERCENT OF A TRUCK LOAD OF MORTAR AMMO NEEDED
C      RPBUSH -- THE PERCENT OF A TRUCK LOAD OF BUSHMASTER AMMO NEEDED
C      NUM1   -- THE UNIT ATTRIBUTE OF THE MOST NEEDED AMMO (J OR K)
C      NUM2   -- THE UNIT ATTRIBUTE OF THE OTHER AMMO
C      ND1    -- THE NUMBER OF ROUNDS NEEDED TO FILL THE GREATEST DEMAND
C      ND2    -- THE NUMBER OF ROUNDS TO BE GIVEN TO THE OTHER WEAPON
C      NUMQ   -- THE QUEUE NUMBER FOR UNIT TRUCKS
C      NUMTK  -- THE NUMBER OF THE TRUCK TAKEN FROM NUMQ TO FILL NEED
C      TMIND  -- THE DELAY TIME ASSESSED FOR A TRUCK INTERDICTION
C      LOAD1  -- THE AMOUNT OF THE MOST NEEDED AMMO ON THE TRUCK NUMTK
C      LOAD2  -- THE AMOUNT OF THE OTHER AMMO ON THE TRUCK
C      NEWLD1 -- THE ROUNDS FROM TRUCK NUMTK TO LOAD ON THE WEAPON SYSTEM
C      NEWLD2 -- THE ROUNDS TO LOAD ON THE OTHER WEAPON
C      KIND   -- THE EVENT NUMBER: 3 = UNTDEP, 8 = UNTARV
C      NRPW1  -- THE ROUNDS LOADED ON EACH WEAPON OF TYPE NUM1
C      NRPW2  -- THE ROUNDS LOADED ON EACH WEAPON OF TYPE NUM2
C      NW1    -- THE NUMBER OF WEAPONS LOADED, TYPE NUM1
C      NW2    -- THE NUMBER OF WEAPONS LOADED, TYPE NUM2
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
C**** FIND THE AMMO TYPE WITH THE LARGEST DEMAND - NUM1
   10 NDMORT = IUNIT(I,K+7) * IUNIT(I,K+1) - IUNIT(I,K+4)
      NDBUSH = IUNIT(I,J+7) * IUNIT(I,J+1) - IUNIT(I,J+4)
      RMIX16 = IMIX(16,16)
      RMIX17 = IMIX(16,17)
      RPMORT = NDMORT/RMIX16
      RPBUSH = NDBUSH/RMIX17
      IF(RPMORT .GT. RPBUSH) THEN
         NUM1 = K
         NUM2 = J
         ND1  = NDMORT
      ELSE
         NUM1 = J
         NUM2 = K
         ND1  = NDBUSH
         ND2  = RMIX16 * RPBUSH
      END IF
C
      WRITE(LUOUT,20)IUNIT(I,NUM1),ND1,IUNIT(I,NUM2),ND2
   20 FORMAT('  RELOAD AMMO TYPES ',4I5,' ROUNDS')
C**** PULL TRUCK FROM QUEUE
      NUMQ = IQ(1,I)
   30 CALL FINTK(NUMQ,16,NUMTK,0)
      WRITE(LUOUT,40)NUMTK
   40 FORMAT('  RELOAD AFTER FINTK ',I5)
      IF(NUMTK .EQ. 0) RETURN
C**** CHECK FOR INTERDICTION
      CALL INTRDK(NUMTK,TMIND)
      IF(TMIND .NE. 0) THEN
C ****      ADD ONE TO THE NUMBER OF TRUCKS KILLED DURING RELOAD
         JUNIT(IUNIT(I,1),23) = JUNIT(IUNIT(I,1),23) + 1
C        DECREMENT UNIT AMMO ON TRUCKS
      IUNIT(I,J+8)=IUNIT(I,J+8)-(IMIX(16,17)*ITRUCK(NUMTK,6)+9999)/10000
      IUNIT(I,K+8)=IUNIT(I,K+8)-(IMIX(16,16)*ITRUCK(NUMTK,6)+9999)/10000
         IPARM(1) = I
         IPARM(2) = NUMTK
         IPARM(4) = 16
C         SCHEDULE ASPARV FOR KILLED TRUCK
         CALL SCHED(5,IPARM,TIME + TMIND)      @ ASPARV
         ITRUCK(NUMTK,6) = 0
         GO TO 30
      END IF
C
C**** CALCULATE THE TRUCK AMMO LOAD FOR AMMO TYPE NUM1 AND NUM2
      LOAD1 = (IMIX(16,IUNIT(I,NUM1))*ITRUCK(NUMTK,6)+9999)/10000
      LOAD2 = (IMIX(16,IUNIT(I,NUM2))*ITRUCK(NUMTK,6)+9999)/10000
C**** CHECK DEMAND AGAINST LOAD
      IF(ND1 .GE. LOAD1) THEN
         NEWLD1 = LOAD1
         NEWLD2 = LOAD2
         ITRUCK(NUMTK,6) = 0
         KIND = 3
      ELSE
         NEWLD1 = ND1
         NEWLD2 = ND2
         ITRUCK(NUMTK,6) = 10000 * (LOAD1-ND1)/IMIX(16,IUNIT(I,NUM1))
         KIND = 8
      END IF
      IF(ITRUCK(NUMTK,6) .LE. 1000)THEN
         NEWLD1 = LOAD1
         NEWLD2 = LOAD2
         ITRUCK(NUMTK,6) = 0
         KIND = 3
      END IF
C**** CALCULATE THE UNLOAD TIME, FIND ROUNDS PER WPN AND NUM WPNS
```

```
         NRPW1 = 1
      ELSE
         NRPW1 = ND1 / IUNIT(I,NUM1+2)
      END IF
      IF(IUNIT(I,NUM2+2) .EQ. 0) THEN
         NRPW2 = 1
      ELSE
         NRPW2 = ND2 / IUNIT(I,NUM2+2)
      END IF
      IF(NRPW1 .LE. 0) NRPW1 = 1
      IF(NRPW2 .LE. 0) NRPW2 = 1
      NW1 = MIN0(LOAD1/NRPW1,IUNIT(I,NUM1+2))
      NW2 = MIN0(LOAD2/NRPW2,IUNIT(I,NUM2+2))
      DELAY = 2 * IRSTME(16,3) + (NW1 + NW2) * (IRSTME(16,1))
      IF(NUM1 .EQ. J)THEN
         DELAY = DELAY + NEWLD2 * IRSTME(16,2)/100
      ELSE
         DELAY = DELAY + NEWLD1 * IRSTME(16,2)/100
      END IF
C**** SEND THE TRUCK OUT
      IPARM(1) = I
      IPARM(2) = NUMTK
      CALL SCHED(KIND,IPARM,TIME + DELAY)       @ UNTDEP/UNTARV
      ITRUCK(NUMTK,11) = ITRUCK(NUMTK,11) + 1 @ RELOAD COUNTER
      ITRUCK(NUMTK,3) = 0
C**** ADJUST AMMO ON TRUCKS AND CURRENT AMMO SUPPLY
      IUNIT(I,NUM1+8) = IUNIT(I,NUM1+8) - NEWLD1
      IUNIT(I,NUM2+8) = IUNIT(I,NUM2+8) - NEWLD2
      IUNIT(I,NUM1+4) = IUNIT(I,NUM1+4) + NEWLD1
      IUNIT(I,NUM2+4) = IUNIT(I,NUM2+4) + NEWLD2
C**** DECREMENT THE NUMBER OF ROUNDS SHORT
      IUNIT(I,NUM1+3) = IUNIT(I,NUM1+3) - NEWLD1
      IF(IUNIT(I,NUM1+3) .LT. 0)IUNIT(I,NUM1+3) = 0
      IUNIT(I,NUM2+3) = IUNIT(I,NUM2+3) - NEWLD2
      IF(IUNIT(I,NUM2+3) .LT. 0)IUNIT(I,NUM2+3) = 0
      IUNIT(I,NUM1+2) = IUNIT(I,NUM1+2) - NW1
      IF(IUNIT(I,NUM1+2) .LT. 0) IUNIT(I,NUM1+2) = 0
      IUNIT(I,NUM2+2) = IUNIT(I,NUM2+2) - NW2
      IF(IUNIT(I,NUM2+2) .LT. 0) IUNIT(I,NUM2+2) = 0
C**** ADD THE DELAY TIME TO THE TOTAL UNIT RELOAD TIME
      JUNIT(IUNIT(I,1),21) = JUNIT(IUNIT(I,1),21) + DELAY
      IF(IUNIT(I,NUM1+7)*IUNIT(I,NUM1+1)-IUNIT(I,NUM1+4).GT.0) GO TO 10
C
      RETURN
      END
```

r. SUBROUTINE EDITD

```
      SUBROUTINE EDITD
C**** ALLOWS EDITING OF DATA IN COMMON LOG
C     CALLED BY EDIT, CONTRL(THE EDIT OR ARM MENUS)
C     CALLS     READF
C**** H. JONES    FEB 79
C**** NOTE ALL VARIABLES IN COMMON LOG ARE 2 DIMENSIONAL
      CHARACTER*10 AUNIT, NAME, IWORD, IEND
      COMMON /LOG/ IATP(10,53), IASP(10,110), IUNIT(75,142),
     $  ITRUCK(1400,15), ITYPE(9,6), IMIX(91,32), INTER(1,10),
     $  IRSTME(23,3), IATPSD(1,5),
     $  IDAY(1,1), TIME(1,1), IATPAM(10,40), ICSA(3,32), LPPAR(1,10),
     $  IASPAM(10,120), LUOUT(1,1), TCIST(1,1), TCILNG(1,1),LOOK(1,19)
     $  ,JUNIT(8,24),JATP(10,6),JASP(10,9)
     $ ,IATPSP(10,22),IASPSP(10,30),IAMLVL(2,30),ISERV(1,10)
      COMMON / AUNIT / AUNIT(75,2)
      DIMENSION   INTGR(10), REAL(10), IWORD(10)
      INTEGER*4 SKIP
      DIMENSION NAME(27), LIMIT1(27), LIMIT2(27)
C
      DATA NAME /'IATP', 'IASP', 'IUNIT', 'ITRUCK', 'ITYPE',
     $  'IMIX', 'INTER', 'IRSTME', 'IATPSD', 'IDAY',
     $  'TIME', 'IATPAM', 'ICSA',  'LPPAR',  'IASPAM', 'LUOUT', 'TCIST',
     $  'TCILNG', 'LOOK', 'AUNIT','JUNIT','JATP','JASP',
     $  'IATPSP','IASPSP','IAMLVL','ISERV'/
C
      DATA LIMIT1 /10, 10, 75, 1400, 9,
     $   91, 1, 23, 1, 1,
     $  1, 10, 3, 1, 10, 1, 1, 1, 19, 75, 8, 10,10,10,10,2,1/
C
      DATA LIMIT2 /53, 110, 142, 15, 6,
     $   32, 10, 3, 5, 1,
     $  1,  40, 32, 10, 120, 1, 1, 1, 1, 2, 24, 6, 9,22,30,30,10/
      DATA IEND/'END'/
      NNAMES = 27
      LU1 = 5
      LEAP = 1
      SKIP = 1
C
   10 WRITE(6,120)
      CALL READF (LU1, 10, INTGR, REAL, IWORD)
C
C**** BRANCH ON DATA TYPE
   20 IF(IWORD(1) .EQ. IEND) GO TO 110
      DO 30 KTYPE = 1,NNAMES
      IF(IWORD(1) .EQ. NAME(KTYPE)) GO TO 40
   30 CONTINUE
      GO TO 10
C
C**** SET LIMITS FOR DATA TYPE
   40 ILOW = INTGR(1)
      IHIGH = INTGR(2)
      IFLG = 0
      IF(ILOW .EQ. 0 .AND. IHIGH .EQ. 0) IFLG = 1
      IF(IFLG .EQ. 1) IHIGH = LIMIT1(KTYPE)
      IF(IHIGH .EQ. 0) IHIGH = ILOW
      IF(IHIGH .GT. LIMIT1(KTYPE))  IHIGH = LIMIT1(KTYPE)
      IF(ILOW .GT. LIMIT1(KTYPE)) GO TO 10
C
C**** BACKGROUND HAS BEEN SET, READ CHANGE OR LIST COMMAND
   50 WRITE(6,140)
      CALL READF (LU1, 10, INTGR, REAL, IWORD)
      IF(IWORD(1) .EQ. 'LIST' .OR. IWORD(1) .EQ. 'L') GO TO 60
      IF(IWORD(1) .EQ. 'CHANGE' .OR. IWORD(1) .EQ. 'C') GO TO 90
      IF(IWORD(1) .EQ. 'LEAP')THEN
         LEAP = INTGR(1)
         GOTO 50
      ELSE
         IF(IWORD(1) .EQ. 'SKIP')THEN
            SKIP = INTGR(1)
            GOTO 50
         END IF
      END IF
      GO TO 20
C
C**** LIST COMMAND
   60 IATT1 = INTGR(1)
      IATT2 = INTGR(2)
      IFLG = 0
      IF(IATT1 .EQ. 0 .AND. IATT2 .EQ. 0) IFLG = 1
      IF(IFLG .EQ. 1) IATT1 = 1
      IF(IFLG .EQ. 1) IATT2 = LIMIT2(KTYPE)
      IF(IATT2 .EQ. 0) IATT2 = IATT1
      IF(IATT2 .GT. LIMIT2(KTYPE))  IATT2 = LIMIT2(KTYPE)
C
      IF(IATT1 .GT. LIMIT2(KTYPE)) GO TO 50
      DO 80 INDEX = ILOW, IHIGH, LEAP
      WRITE(6,150) NAME(KTYPE), INDEX
      DO 80 IATT = IATT1, IATT2, SKIP
      IF(KTYPE .EQ. 1) IVALUE = IATP(INDEX, IATT)
      IF(KTYPE .EQ. 2) IVALUE = IASP(INDEX, IATT)
      IF(KTYPE .EQ. 3) IVALUE = IUNIT(INDEX, IATT)
      IF(KTYPE .EQ. 4) IVALUE = ITRUCK(INDEX, IATT)
      IF(KTYPE .EQ. 5) IVALUE = ITYPE(INDEX, IATT)
      IF(KTYPE .EQ. 6) IVALUE = IMIX(INDEX, IATT)
      IF(KTYPE .EQ. 7) IVALUE = INTER(INDEX, IATT)
      IF(KTYPE .EQ. 8) IVALUE = IRSTME(INDEX, IATT)
      IF(KTYPE .EQ. 9) IVALUE = IATPSD(INDEX,IATT)
      IF(KTYPE .EQ. 10) IVALUE = IDAY(INDEX,IATT)
      IF(KTYPE .EQ. 11) IVALUE = TIME(INDEX,IATT)
      IF(KTYPE .EQ. 12) IVALUE = IATPAM(INDEX,IATT)
      IF(KTYPE .EQ. 13) IVALUE = ICSA(INDEX,IATT)
      IF(KTYPE .EQ. 14) IVALUE = LPPAR(INDEX,IATT)
      IF(KTYPE .EQ. 15) IVALUE = IASPAM(INDEX,IATT)
      IF(KTYPE .EQ. 16) IVALUE = LUOUT(INDEX,IATT)
      IF(KTYPE .EQ. 17) IVALUE = TCIST(INDEX,IATT)
      IF(KTYPE .EQ. 18) IVALUE = TCILNG(INDEX,IATT)
      IF(KTYPE .EQ. 19) IVALUE = LOOK(INDEX,IATT)
```

```
         WRITE(6,210) IATT, AUNIT(INDEX,IATT)
         GO TO 50
      END IF
      IF(KTYPE .EQ. 21) IVALUE = JUNIT(INDEX,IATT)
      IF(KTYPE .EQ. 22) IVALUE = JATP(INDEX,IATT)
      IF(KTYPE .EQ. 23) IVALUE = JASP(INDEX,IATT)
      IF(KTYPE .EQ. 24) IVALUE = IATPSP(INDEX,IATT)
      IF(KTYPE .EQ. 25) IVALUE = IASPSP(INDEX,IATT)
      IF(KTYPE .EQ. 26) IVALUE = IAMLVL(INDEX,IATT)
      IF(KTYPE .EQ. 27) IVALUE = ISERV(INDEX,IATT)
      IF(KTYPE .LE. 0 .OR. KTYPE .GT. 27)GO TO 40
C
   70 WRITE(6,160) IATT, IVALUE
   80 CONTINUE
      GO TO 50
  55  WRITE(6,210) IATT, AUNIT(INDEX,IATT)
      GO TO 50
C
C
C**** CHANGE COMMAND
   90 IATT = INTGR(1)
      VALUE = INTGR(2) + REAL(1)
      IF(IATT .GT. LIMIT2(KTYPE)) GO TO 50
C
      DO 100 INDEX = ILOW, IHIGH, LEAP
C     INSERT VALUE IN PROPER ARRAY
      IF(KTYPE .EQ. 1) IATP(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 2) IASP(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 3) IUNIT(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 4) ITRUCK(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 5) ITYPE(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 6) IMIX(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 7) INTER(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 8) IRSTME(INDEX, IATT) = VALUE
      IF(KTYPE .EQ. 9) IATPSD(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 10) IDAY(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 11) TIME(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 12) IATPAM(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 13) ICSA(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 14) LPPAR(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 15) IASPAM(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 16) LUOUT(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 17) TCIST(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 18) TCILNG(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 19) LOOK(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 20)THEN
        WRITE(6,200)
        READ(5,130) IWORD(2)
        AUNIT(INDEX,IATT) = IWORD(2)
      END IF
      IF(KTYPE .EQ. 21) JUNIT(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 22) JATP(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 23) JASP(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 24) IATPSP(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 26) IAMLVL(INDEX,IATT) = VALUE
      IF(KTYPE .EQ. 27) ISERV(INDEX,IATT) = VALUE
C
  100 CONTINUE
      GO TO 50
C
  110 RETURN
  120 FORMAT(1X,'VARIABLE NAME = ')
  130 FORMAT(A10)
  140 FORMAT(1X,'..')
  150 FORMAT(/,1X,A10,I5)
  160 FORMAT(1X,'ATTRIBUTE ',I4,' = ',I7)
  200 FORMAT(1X,' UNIT NAME = ')
  210 FORMAT(1X,' ATTRIBUTE ',I4,' = ',A10)
      END
```

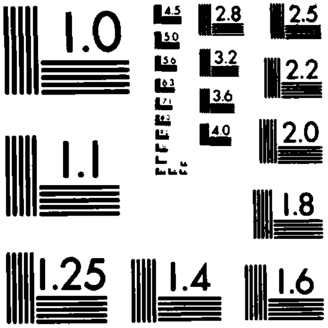
S. SUBROUTINE ENDSIM

```
      SUBROUTINE ENDSIM(IPARM)
C     EVENT TYPE 19
C**** SIMULATION END
C
C     WRITES FILE 4 (THE TDATABASE FOR THE NEXT CI).
C
C     CALLED BY MAINARM
C     SCHEDULED BY CONTRL, INIT
C
C**** H. JONES    FEB 79
C
      CHARACTER*10 AUNIT
      INCLUDE LOG,LIST
      INCLUDE QUENUM,LIST
      INCLUDE QUEPNT,LIST
      INCLUDE AUNIT,LIST
      DIMENSION IPARM(5)
C
      WRITE(4) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,
     Z   IATPSD,IDAY,TIME,IATPAM,ICSA,LPPAR,IASPAM,LUOUT,TCIST,
     Z  TCILNG, LOOK, IHEAD, ITEMS, AUNIT, JUNIT, JATP, JASP,
     Z  IATPSP,IASPSP,IAMLVL,ISERV
C
C**** WRITES TERMINATION MESSAGE
      IF(IPARM(1) .EQ. 9999) WRITE(6,10) TIME                @ NORMAL
      IF(IPARM(1) .EQ. 8888) WRITE(6,11) TIME                @ ABNORMAL
   10 FORMAT(1X,'SCHEDULED STOP, TIME =   ',F8.1,//,1X,'SSG ARMPL.FREE;
     Z         THEN SSG ARMPL.EDITYES')
   11 FORMAT(1X,'STOP SIIMULATION FROM CONTROL, TIME =    ',F8.1)
C
      RETURN
      END
```

t. SUBROUTINE EVSTOP

```
      SUBROUTINE EVSTOP
C     CALLED BY MAINARM
C**** WRITES UNUSED EVENTS ON THE EVENTS FILE FOR THE NEXT CI.
C**** EVTCI--.                   (FILE 3)
C**** H. JONES    FEB 79
C
      INCLUDE EVENTS,LIST
      WRITE(3)  JSTAT, JEVDS, IEVS
C
      RETURN
      END
```

AD-A131 218   AMMUNITION RESUPPLY MODEL VOLUME 2 PROGRAMMER'S MANUAL   2/3
(U) COMBINED ARMS OPERATIONS RESEARCH ACTIVITY FORT
LEAVENWORTH KS   A M RESNICK ET AL.   MAY 83
UNCLASSIFIED   CAORA/TR-6/83-VOL-2   F/G 19/1   NL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1.1
1.8
1.25
1.4
1.6

u. SUBROUTINE FINTK

```
      SUBROUTINE FINTK (NQUE, NUMAM, NUMTK, MINMAX)
C**** DETERMINES NUMBER OF TRUCK (NUMTK) IN QUEUE (NQUE) HAS
C**** THE SMALLEST PERCENTAGE LOAD OF ROUNDS OF TYPF (NUMAM)
C**** JIM FOX        JAN 79
C
C     CALLED BY ASP, ASPAR1, ATP, ATPARV, DUALMX, LDFWDR, RELOAD, SERVER
C     CALLS     GETQUE, PUTQUE
C
C**** LOCAL VARIABLES:
C**** ITRCK  -- SAVES TRUCK NUMBER WITH THE SMALLEST LOAD
C**** NPERSV -- SMALLEST PERCENT FOUND
C**** NCHTK  -- END OF QUEUE CHECK
C**** MIX    -- AMMO MIX INDEX
C**** MINMAX -- 0, FIND TRUCK WITH SMALLEST LOAD
C              1, FIND TRUCK WITH LARGEST LOAD
C
      INCLUDE LOG,LIST
C**** INITIALIZE AMMO PERCENT
      IF(MINMAX .EQ. 0)THEN
         NPERSV = 10010
      ELSE
         NPERSV = 0
      END IF
C
C**** ASSUME NO TRUCK WITH PROPER AMMO
      NUMTK = 0
C
C**** BRING FIRST TRUCK FROM QUEUE (ITRCK)
      CALL GETQUE (ITRCK, NQUE)
C
C**** IF QUEUE IS EMPTY RETURN
      IF(ITRCK .EQ. 0) RETURN
C
C**** THERE ARE SOME TRUCKS IN QUEUE
C**** SEARCH FOR RIGHT TRUCK, STORE NCHTK AND PUT IT BACK IN QUEUE
      NCHTK = ITRCK
      CALL PUTQUE(ITRCK, NQUE)
C
C**** PULL TRUCK FROM QUEUE
   25 CALL GETQUE(ITRCK,NQUE)
C
C**** DETERMINE AMMO MIX TYPE
      MIX = ITRUCK(ITRCK, 5)
      LOAD = ITRUCK(ITRCK,6)
C        IF THIS TRUCK HAS THE DESIRED LOAD, THEN KEEP TRACK IN NUMTK.
C**** IF RIGHT AMMO COMPARE LOAD SIZE; IF NOT GO TO CHECK END QUEUE
      IF(IMIX(MIX, NUMAM) .GT. 0) THEN
         IF(MINMAX .EQ. 0 .AND. LOAD .LE. NPERSV .OR.
     $      MINMAX .GE. 1 .AND. LOAD .GE. NPERSV) THEN
            IF(ITRUCK(ITRCK,6) .NE. 0) THEN
               IF(NUMTK .NE. 0) CALL PUTQUE(NUMTK, NQUE)
               NPERSV = ITRUCK(ITRCK,6)
               NUMTK = ITRCK
               RETURN
            END IF
         END IF
      END IF
C**** WRONG TRUCK, PUT BACK IN QUEUE
      CALL PUTQUE(ITRCK,NQUE)
C
C**** IF LAST TRUCK, RETURN
      IF(ITRCK .NE. NCHTK) GO TO 25
C
C**** HAVE FOUND CORRECT AMMO CHECK TO SEE IF SHOULD BE SAVED
      RETURN
      END
```

V. SUBROUTINE GETEVT

```
      SUBROUTINE GETEVT(IEVT,ITH,ITS)
C     GETS NEXT EVENT (FROM EVENT QUEUE)
C
C     CALLED BY NEXTEV, WHICH RETURNS THE EVENT TO MAINARM.
C     GETEVT DOES NOT CALL ANYTHING.
C
C     RETURNS IEVT(5) -- THE PARMS FOR THE NEXT EVENT IN QUEUE.
C             ITH     -- EVENT TIME, IN WHOLE MINUTES.
C             ITS     -- THE FRACTIONAL PART OF EVENT TIME(MIN * 3600).
C
C     BOB DAVISON
C
      INCLUDE EVENTS,LIST
      DIMENSION IEVT(5),JFORE(2048),JBACK(2048)
      EQUIVALENCE (JFORE(1),JEVDS(1,1)),(JBACK(1),JEVDS(1,2)),
     Z  (JFIRST,JSTAT(1)),(JLAST,JSTAT(2)),(JEMPTY,JSTAT(3)),
     Z  (NUMEVT,JSTAT(4)),(NEMPTY,JSTAT(5)),(MAXEVT,JSTAT(6))
C
C     CHECK IF AN EVENTS IN QUEUE ... IF NONE, RETURN
C
      DO 20 IN = 1,5
         IEVT(IN) = IEVS(IN,JFIRST)              @ PARMS FOR THE NEXT EVT
 20   CONTINUE
      ITH = JEVDS (JFIRST,3)
      ITS = JEVDS (JFIRST,4)
      IF(NUMEVT.LE.0) RETURN
C
      NEXT = JFORE(JFIRST)
      JFORE (JFIRST) = JEMPTY                    @ ADD THIS NODE TO
      JEMPTY=JFIRST                              @ THE EMPTY EVENT LIST
      IF(NEXT.LE.0) NEXT = 1
      JBACK(NEXT) = 0
      JFIRST = NEXT
      NEMPTY = NEMPTY + 1
      NUMEVT = NUMEVT - 1
C
      RETURN
      END
```

W. SUBROUTINE GETQUE

```
      SUBROUTINE GETQUE (ITEM, NUMQUE)
C     GETS 'FIRST ITEM IN QUEUE' FROM NUMQUE
C     TO GET TRUCK FROM QUEUE 4 -- CALL GETQUE (N,4)
C     VEHICLE NUMBER IS RETRUNED IN ITEM
C
C     CALLED BY ASPAR1, ASPAR2, ASPARV, ATPARV, CSAARV, CSADEP,
C               DEPASP, FINTK, SERVER (EDIT PROGM: EDIT, PRINT, TRKPUT)
C     CALLS     NONE
C**** H. JONES    DEC 78
      INCLUDE QUENUM,LIST
      INCLUDE QUEPNT,LIST
      ITEM = 0
      LITEM = 0
C
      IF(NUMQUE .LE. 0 .OR. NUMQUE .GT. 176) THEN
         PRINT*,'BAD QUEUE NUMBER IN GETQUE...'
         RETURN
      END IF
      IPOINT = IHEAD(NUMQUE)
C                                              SEARCH QUEUE FOR FRONT
   10 IF(IPOINT .EQ. 0) GO TO 20
      LITEM = ITEM
      ITEM = IPOINT
      IPOINT = ITEMS(ITEM)
      GO TO 10
C
   20 IF(LITEM .GT. 0)  ITEMS(LITEM) = 0
      IF(LITEM .EQ. 0) IHEAD(NUMQUE) = 0
C
      RETURN
      END
```

X.   SUBROUTINE HASPAR

```
      SUBROUTINE HASPAR (IPARM)
C**** EVENT HASPAR -- ARRIVAL(RETURN) OF HELICOPTER BACK AT ASP.
C     EVENT TYPE 15
C     CALLED BY MAINARM
C     CALLS     NOTHING
C
C**** J. FOX    JAN 79
C
C**** IPARM(1)  -- UNIT #(IF SCHED BY DEMAND), ASP#(IF SCHED BY HELARV)
C**** IPARM(2)  -- HELICOPTER NUMBER
C
C**** SCHEDULES -- NOTHING
C**** SCHEDULED BY DEMAND, HELARV
C
C*****  CHANGES NUMBER OF HELOS IN USE(LPPAR(5)).
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
C       LOCAL VARIABLES
C     NHELI  -- HELICOPTER NUMBER FROM ITRUCK ARRAY
C
C****** INCREMENT NUMBER OF HELICOPTER AVAILABLE FOR USE
      LPPAR(5) = LPPAR(5) + 1
C
      NHELI = IPARM(2)
C
C****** CHANGE STATUS TYPE
      ITRUCK (NHELI,3) = 3
C                                              HELI KEPT FULL
      ITRUCK (NHELI,6) = 10000
      RETURN
      END
```

```
y.        SUBROUTINE HELARV
      SUBROUTINE HELARV (IPARM)
C**** EVENT HELARV  --  ARRIVAL OF HELICOPTER AT UNIT
C                       FOR EMERGENCY RESUPPLY OF ARTY.
C     EVENT TYPE 14
C     CALLED BY MAINARM
C     CALLS     OPERA, SCHED
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- HELICOPTER NUMBER
C
C**** SCHEDULES  --  HASPAR, ARRIVAL BACK AT ASP.
C**** SCHEDULED BY-  DEMAND
C
C**** CHANGES NUMBER OF HELOS IN USE TO SUPPORT THIS UNIT.
C             AMMO AT UNIT.
C
C     LOCAL VARIABLE DEFINITION
C     MIX - AMMO MIX INDEX TO COMMON IMIX-
C     IND - INDEX OF CURRENT AMMO SUPPLIES IN IUNIT
C     IN - INDEX OF TYPE AMMO IN IUNIT
C     IAMTYP - UNIT IN THE AMMO TYPE
C     TVLTIM - TRAVEL TIME
C     TFAIL - TIME LOST DUE TO MAINTENANCE FAILURE
C     TMIND - TIME LOST DUE TO INTERDICTION
C     TOTIM - TIME OF SCHEDULED EVENT
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
      NUNIT = IPARM(1)
      NHELI = IPARM(2)
C
C     FIND THE MIX INDEX CARRIED BY HELICOPTER
      MIX = ITRUCK(NHELI,5)
      IF(MIX .LE. 0)RETURN
C     INCREMENT THE AMMO ON HAND AT THE UNIT
      DO 5 I = 1,LPPAR(6)
         IND = 13 * I - 5
         IN = IND + 4
C        FIND UNIT I TH  AMMO TYPE
         IAMTYP = IUNIT(NUNIT,IND)
         IUNIT(NUNIT,IN) = IUNIT(NUNIT,IN) + IMIX(MIX,IAMTYP)
         IUNIT(NUNIT,IN-1) = IUNIT(NUNIT,IN-1) - IMIX(MIX,IAMTYP)
    5 CONTINUE
C     FIND TRAVEL TIME BACK TO ASP
      TVLTIM = 60. * IUNIT(NUNIT,5) / ITYPE(6,IDAY+1)
C     FIND THE DELAY ASSOCIATED WITH MECHANICAL FAILURE
      CALL OPERA(NHELI,TVLTIM,TFAIL)
C**** DECREMENT NUMBER OF HELO SERVING THIS UNIT
      IUNIT(NUNIT,138) = IUNIT(NUNIT,138) - 1
C**** ADD NO. OF HELO THAT HAVE SERVED UNIT
```

```
C     SCHEDULE HELARV AT ASP
      IPARM(1) = IUNIT(NUNIT,3)
      TOTIM = TIME + TVLTIM + TFAIL
      CALL SCHED(15,IPARM,TOTIM)                @ HASPAR
C     UPDATE ITRUCK STATUS
      ITRUCK(NHELI,3) = 4
      ITRUCK(NHELI,6) = 0                       @ LOAD
C
      RETURN
      END
```

```
z.      SUBROUTINE INIT
          SUBROUTINE INIT
    C**** INITIALIZES SIMULATION
    C     CALLED FROM MAINARM AT START OF THE CI.
    C     CALLS  RDJIFF TO INITIALIZE DEMAND FOR THE WHOLE CI.
    C            ALSO:    QINIT, SEVENT, SCHED, TRKTIM, CONTRL
    C
    C     SCHEDULES:    ENDSIM
    C**** H. JONES    JAN 79
    C
          CHARACTER*3 IANSW
          CHARACTER*10 AUNIT
             INCLUDE LOG
             INCLUDE QUENUM,LIST
             INCLUDE QUEPNT,LIST
             INCLUDE AUNIT,LIST
             INCLUDE EVENTS,LIST
          DIMENSION IPARM(5)
    C
    C**** READ FILES WITH ALL COMMON DATA
          READ(3) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,IRSTME,
         Z  IATPSD,IDAY,TIME,IATPAM,ICSA,LPPAR,IASPAM,LUOUT,TCIST,
         Z  TCILNG, LOOK, IHEAD, ITEMS, AUNIT, JUNIT, JATP, JASP,
         Z  IATPSP,IASPSP,IAMLVL,ISERV
    C
          READ(7)JSTAT,JEVDS,IEVS
    C
          IF(TIME .LT. 10.0)CALL QINIT
       21 FORMAT(A3)
          PRINT*,'DO YOU WISH TO ADD EVENTS?'
          READ(5,21)IANSW
          IF(IANSW .EQ. 'YES' .OR. IANSW .EQ. 'Y  ')THEN
             CALL SEVENT         @ READ ADDTNL EVENTS FILE(BUILT BY ADDEVT)
          END IF
    C
          WRITE(6,22)
       22 FORMAT(' ENTER TIME TO STOP SIMULATION   ')
          READ(5,*) TSTOP
          IPARM(1) = 9999
          IPARM(2) = 9999
          IPARM(3) = 9999
          IPARM(4) = 9999
          CALL SCHED (19, IPARM, TSTOP)            @ ENDSIM
    C
          IF(TIME .LE. 10.)CALL TRKTIM
          CALL CONTRL (TIME)
          TIME = TCIST
    C
    C**** READ FILE FOR DEMANDS
          CALL RDJIFF
          RETURN
          END
```

aa. SUBROUTINE INTRDK

```
      SUBROUTINE INTRDK(NUMTK,TLOST)
C
C     DETERMINES IF A TRUCK ABOUT TO TRAVEL A ROUTE
C     WILL BE INTERDICTED ALONG THAT ROUTE AND ASSESSES
C     TIME DELAY FOR A REPLACEMENT TRUCK.
C
C     REPLACEMENT TRUCKS SHOULD BE SCHEDULED INTO THE ASP
C     AFTER A DELAY TIME OF 'TLOST' MINUTES.
C     TWO DEPTH ZONES ARE CONSIDERED.
C
C     CALLED BY ASP, ASPAR1, ASPAR2, ATP, ATPAR1, ATPAR2, ATPARV,
C               CSADEP, DUALMX, RELOAD, UNTDEP
C     CALLS     NOTHING
C
C**** J. FOX     JAN 79
C
C****   ZONE 1  ALL UNIT TRUCKS SAVE THOSE DIVERTED FROM ATP TO ASP
C****   ALL OTHER REPLENISHMENT TRUCKS.
C
C     NUMTK -- THE NUMBER OF THE TRUCK BEING CONSIDERED.
C     TLOST -- 0 IF TRUCK IS NOT KILLED
C           -- REPLACEMENT TIME IF THE TRUCK IS KILLED.
C     MODCK -- USED TO FIGURE MODULAR ARITH
C
C**** SETS LOAD OF REPLACEMENT TRUCK TO 100 PER CENT
      INCLUDE LOG,LIST
      TLOST = 0.                @ ASSUME TK MADE IT
C**** DETERMINE IF THE TRUCK IS IN ZONE 2. MISSION > 1
      IF(ITRUCK(NUMTK,2) .GT. 1)GO TO 15
C**** TRUCK IS TRAVELING THROUGH ZONE 1
C**** INCREMENT COUNTER OF TRUCKS IN ZONE 1
      INTER(9) = INTER(9) + 1
C**** IF SUFFICIENT NUMBER OF KILLS THIS CI RETURN
      IF(INTER(1) .GE. INTER(3))RETURN
C
C**** IF NOT EQUAL 0 MODULO INTER(7) DO NOT KILL,GO TO RETURN
      MODCK =(INTER(9) / INTER(7)) * INTER(7)
      IF(MODCK .NE. INTER(9))RETURN
C****   CHECK IF UNIT HAS HAD A TRUCK INTERDICTED THIS CI
      L = ITRUCK(NUMTK,4)
C                                   ONLY ONE TRUCK INTRDKED PER CI
      IF(IUNIT(L,6) .GE. TCIST) RETURN
      INTER(1) = INTER(1) + 1
      TLOST = INTER(5)
C
C          IF TRUCK WAS ON RESUPPLY RUN, SUBTRACT AMMO DUE IN
      IF(ITRUCK(NUMTK,3) .GE. 4 .AND. ITRUCK(NUMTK,3) .LE. 6)THEN
         L = ITRUCK(NUMTK,4)
         MIX = ITRUCK(NUMTK,5)
         DO 10 I = 1,LPPAR(6)
            K = I * 13 - 5
            IF(IUNIT(L,K) .EQ. 0)GO TO 10
            IUNIT(L,K+12) = IUNIT(L,K+12) - IMIX(MIX,IUNIT(L,K))
      END IF
      IF(ITRUCK(NUMTK,5) .EQ. 10)ITRUCK(NUMTK,5) = 10 + LPPAR(7)
      ITRUCK(NUMTK,3) = 7
      ITRUCK(NUMTK,9) = ITRUCK(NUMTK,9) + 1    @ TRUCK INTRDK COUNTER
      IF(ITRUCK(NUMTK,1) .EQ. 1 )THEN
         ITRUCK(NUMTK,1) = 3
         MIX = ITRUCK(NUMTK,5)  + 30
         ITRUCK(NUMTK,5) = MIX
      END IF
      IUNIT(L,6) = TIME
      WRITE(LUOUT,30) NUMTK,INTER(5)
 30   FORMAT(' HAVE KILLED ZONE 1 TRUCK ',I5,' TIME LOST = ',I6)
      RETURN
C
C
C**** ZONE 2 TRUCK. INCREMENT NUMBER OF ZONE 2 TRIPS.
   15 INTER(10) = INTER(10) + 1
C**** IF SUFFICIENT ZONE TWO TRUCKS ALREADY KILLED GO TO RETURN
      IF(INTER(2) .GE. INTER(4))RETURN
C**** IF NOT ZERO MNDE INTER(8), DO NOT KILL
      MODCK = (INTER(10) / INTER(8)) * INTER(8)
      IF(MODCK .NE. INTER(10))RETURN
C
C**** HAVE KILLED THIS TRUCK.  INCREMENT NUMBER KILLED
      ITRUCK(NUMTK,3)=7
      ITRUCK(NUMTK,9) = ITRUCK(NUMTK,9) + 1  @ TRUCK INTRDK COUNTER
      INTER(2) = INTER(2) +1
C**** SET TIME LOST.  ASSUME NOT A UNIT TRUCK.
      TLOST = INTER(6)
      WRITE(LUOUT,20) NUMTK,TLOST
 20   FORMAT(' HAVE KILLED ZONE 2 TRUCK',I5,' TIME LOST = ',F6.1)
C
      RETURN
      END
```

```
bb.       SUBROUTINE IQ
           FUNCTION IQ(ITYPE, NUM)
     C**** RETURNS QUEUE NUMBER ASSOCIATED WITH NUM.
     C     CALLED BY ASP, ASPAR1, ASPAR2, ASPARV, ATP, ATPAR1, ATPAR2,
     C                 ATPARV, DUALMX, LDPWDR, RELOAD, SERVER, UNTARV
     C**** JIM FOX       JAN 79
           IF(ITYPE .LT. 0 .OR. ITYPE .GT. 12) THEN
              PRINT*,'  BAD QUEUE NUMBER IN FUNCTION IQ'
              STOP  ' IQ '
           END IF
           GO TO (10,20,30,40,50,60,70,80,90,100,110,120), ITYPE
     C**** UNIT QUEUE
        10 IQ = NUM
           GO TO 200
     C
     C**** ATP QUEUE FOR CSA-ATP S & P'S
        20 IQ = 75 + NUM
           GO TO 200
     C
     C**** ATP QUEUE FOR ASP-ATP S & P'S
        30 IQ = 85 + NUM
           GO TO 200
     C
     C**** ARTILLERY SERVER QUEUE AT THE ATP
        40 IQ = 95 + NUM
           GO TO 200
     C
     C**** MANEUVER SERVER QUEUE AT THE ATP
        50 IQ = 105 + NUM
           GO TO 200
     C
     C**** QUEUE TO HOLD SERVERS AT ATP
        60 IQ = 115 + NUM
           GO TO 200
     C
     C**** ASP QUEUE FOR CSA-ASP S & P'S
        70 IQ = 125 + NUM
           GO TO 200
     C
     C**** ROUTINE SERVER QUEUE AT THE ASP
        80 IQ = 135 + NUM
           GO TO 200
     C
     C**** MLRS SERVER QUEUE AT THE ASP
        90 IQ = 145 + NUM
           GO TO 200
     C
     C****   SERVER QUEUE AT ASP
       100 IQ = 155 + NUM
           GO TO 200
     C
     C**** S & P QUEUE AT CSA
       110 IQ = 165 + NUM
           GO TO 200
```

```
120 IQ = 176
200 RETURN
    END
```

CC. SUBROUTINE LDPWDR

```
      SUBROUTINE LDPWDR(NRNDS,IPARM,ITYP)
C**** UNLOADS POWDER TRUCK WHEN ARTY AMMO TAKEN FROM ATP
C
C     CALLED BY ATP
C     CALLS     IQ, FINTK, PUTQUE
C
C**** J. FOX     JAN 79
C
C**** IPARM IS IDENTICAL TO ATP
C**** NOTHING IS RETURNED
C
C**** IPARM(2)  -- ATP NUMBER
C
C**** LOCAL VARIABLE DEFINITION
C**** MIX    - NUMBER OF AMMO MIX ON TRUCK FOR COMMON IMIX
C**** NRNTK  - NUMBER OF POWDER CHARGES ON THE TRUCK
C**** NR     - AMMO TYPE FOR POWDER
C**** NPCND  - NUMBER OF CANISTERS STILL NEEDED
C**** NQUE   - ASP-ATP QUEUE NUMBER
C**** NPDRSP - POWDER AMMO TRUCK
C**** NRNDS IS NUMBER OF POWDER CANISTERS NEEDED
C**** NRNTK  - NUMBER OF CANISTERS ON TRUCK
C**** NFZSP  - TRUCK NUMBER OF FUZE S&P
C**** NFZQ   - QUEUE WGERE FUZE TRUCKS ARE FOUND
C**** ITYP   - AMMO TYPE
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
      NATP = IPARM(2)
C
C**** SET AMMO TYPE AND NUMBER OF ROUNDS NEEDED
C     **HARDWIRE FOR ARTY TYPE
      NR = 3
      IF(ITYP .GT. 5)NR = 8
      NPCND = NRNDS
C**** FIND S & P, SAVE QUEUE WE ARE WORKING IN
    5 NQUE = IQ(IATPSD(2),NATP)
      CALL FINTK(NQUE,NR,NPDRSP,0)
C**** IF HAVE TRUCK GO TO 10, ELSE CHECK CSA QUEUE
      IF(NPDRSP .GT. 0)GO TO 10
C
      NQUE = IQ(IATPSD(3),NATP)
      CALL FINTK(NQUE,NR,NPDRSP,0)
C**** IF HAVE S & P GO TO 10, ELSE WRITE ERROR
      IF(NPDRSP .GT. 0)GO TO 10
      WRITE(6,15)NR,NATP
   15 FORMAT('  NO POWDER OF TYPE',I6,' AT ATP ',  I2 )
      WRITE(LUOUT,15)NR,NATP
      RETURN
C
C**** HAVE S & P.  IF INSUFFICIENT AMMO,GO TO 20
   10 MIX = ITRUCK(NPDRSP,5)
```

```
      IF(NRNTK .LT. NPCND)THEN
C**** INSUFFICIENT AMMO
         ITRUCK(NPDRSP,6) = 0
         CALL PUTQUE(NPDRSP,NQUE)
C           DECREMENT ROUNDS NEEDED
         NPCND = NPCND - NRNTK
C           GO GET ANOTHER TRUCK
         GO TO 5
      END IF
C**** SUFFICIENT AMMO, OFFLOAD AND PUT BACK IN QUEUE
      ITRUCK(NPDRSP,6) = (NRNTK - NPCND) * 10000 / IMIX(MIX,NR)
      CALL PUTQUE (NPDRSP, NQUE)
C**** DECREMENT AMMO ON HAND AND DEMAND IN SUBROUTINE ATP
C**** DECREMENT FUZES FROM S & P
      NFZQ = IQ(2,NATP)
      CALL FINTK(NFZQ,20,NFZSP,0)
      IF(NFZSP .EQ. 0)THEN
         WRITE(6,200)NATP,TIME
  200    FORMAT(' NO S & P WITH FUZES, ATP #',I2,', TIME',F8.2)
         WRITE(LUOUT,200)NATP,TIME
         RETURN
      END IF
      NPRCNT = NRNDS * 10000/9000.
      ITRUCK(NFZSP,6) = ITRUCK(NFZSP,6) - NPRCNT
      IF(ITRUCK(NFZSP,6) .LE. 0)ITRUCK(NFZSP,6) = 0
      CALL PUTQUE(NFZSP,NFZQ)
C
      RETURN
      END
```

```
dd.      SUBROUTINE LOOKEV
          SUBROUTINE LOOKEV (KIND, IPARM, EVTIME, IGET)
    C     LOOKEV WRITES EVENTS ON THE AUDIT TRAIL.
    C     DISPLAY OF AN EVENT TYPE MAY BE SUPRESSED BY SETTING
    C        LOOK(EVENT TYPE) = 0
    C
    C        IF IGET = 0   THIS MEANS THE EVENT IS BEING SCHEDULED NOW
    C        IF IGET = 1               THE EVENT WILL BE EXECUTED NOW
    C
    C     CALLED BY MAINARM
    C     CALLS     NOTHING
    C
    C**** H. JONES     MAR 79
    C
          DIMENSION IPARM(5)
          CHARACTER*10 NAME(19),N
    C
          INCLUDE LOG,LIST
          DATA NAME /'DEMAND', 'RELOAD', 'UNTDEP', 'ATPARV', 'ASPARV',
         $  'ATP   ', 'ASP   ', 'UNTARV', 'CSAARV', 'ATPAR1', 'ATPAR2',
         $  'ASPAR1', 'ASPAR2', 'HELARV', 'HASPAR', 'CSADEP', 'REPORT',
         $  'CONTRL', 'ENDSIM'/
    C
          IF(LOOK(KIND) .EQ. 0) RETURN
          IF((KIND.EQ.10.OR.KIND.EQ.11).AND.IPARM(2).EQ.0) RETURN
          N = NAME(KIND)
          IF(IGET .EQ. 1) WRITE(LUOUT,10) N, IPARM, EVTIME
       10 FORMAT(1X,A10,', PARMS = ',5I6,', TIME= ',F8.1)
    C
          IF(IGET .EQ. 0) WRITE(LUOUT,30) N, IPARM, EVTIME
       30 FORMAT(1X,A10,', PARMS = ',5I6,', SCHED TIME= ',F8.1)
          IF(KIND .EQ. 14 .AND. IGET .EQ. 1)WRITE(18,40)N,IPARM,EVTIME
       40 FORMAT(35X,A10,', PARMS = ',5I6,', TIME= ',F8.1)
    C
          RETURN
          END
```

ee. SUBROUTINE NEXTEV

```
      SUBROUTINE NEXTEV (ITYPE, IPARM, EVTIME)
C**** INTERFACE ROUTINE TO GET NEXT EVENT
C          CALLED FROM MAINARM
C          CALLS  GETEVT
C**** H. JONES    DEC 78
C
      DIMENSION IPARM(5)
      CALL GETEVT (IPARM, ITH, ITS)
C                                 ITH -- EVENT TIME IN WHOLE MINUTES
C                                 ITS -- EVENT TIME (FRACTIONAL) * 3600.
      EVTIME = ITH + ITS / 3600.
      ITYPE = IPARM(5)
C
      RETURN
      END
```

ff. SUBROUTINE NXTQUE

```
      SUBROUTINE NXTQUE (ITEM,NUMQUE)
C**** SHOWS NEXT ITEM IN VEHICLE QUEUE(LEAVES IT IN)
C
C     CALLED(IN EDIT PROGRAM) BY  PRINT, TRKPUT
C
C**** H.JONES   FEB 79
      INCLUDE QUENUM,LIST
      INCLUDE QUEPNT,LIST
      ITEM = 0
      LITEM = 0
      IPOINT = IHEAD(NUMQUE)
C
C              SEARCH DOWN QUEUE TO FRONT
   10 IF(IPOINT .EQ. 0) GO TO 20
      LITEM = ITEM
      ITEM = IPOINT
      IPOINT = ITEMS(ITEM)
      GO TO 10
C
   20 RETURN
      END
```

gg.   SUBROUTINE OPERA

```
      SUBROUTINE OPERA (NUMTK, TVLTIM, DELAY)
C**** CALCULATES DELAY DUE TO RELIABILITY FAILURE
C     OPERA RE-INITIALIZES THE TIME TO NEXT FAIL (ITRUCK(N,7))
C     TO A NUMBER EXPONENTALY DISTRIBUTED ABOUT THE MEAN TIME
C     TO FAIL(ITYPE(TYPE,5)) IF THE TRUCK FAILS.
C
C     IF THE TRUCK DOES NOT FAIL, THE RUN TIME FOR THIS TRIP
C     IS DECREMENTED FROM THE TIME TO NEXT FAIL(ITRUCK(N,7)).
C     EACH TRUCK HAS CLOCK OF TIME SINCE LAST FAILURE.
C
C     CALLED BY ASP, ASPAR1, ASPAR2, ASPCK, ATP, ATPAR1, ATPAR2, ATPARV,
C               CSADEP, DEMAND, HELARV, RELOAD, SERVER, UNTDEP
C
C**** H. JONES      JAN 79
C
C**** LOCAL VARIABLES
C     DELAY - TIME LOST DUE TO REMEDIAL MAINTENANCE
C     MTBF - MEAN TIME BETWEEN FAILURES FROM ITYPE
C     TLEFT - TIME LEFT UNTIL NEXT FAILURE AFTER THIS MOVE
C     TVLTIM - TIME LENGH OF THIS MOVE
C
      INCLUDE LOG
      DELAY = 0.
C
C**** COMPARE TRUCKS REMAINING TIME BEFORE FAILURE WITH TRANSIT TIME.
      ITKTYP = ITRUCK(NUMTK, 1)
      TLEFT = ITRUCK(NUMTK,7) - TVLTIM
      IF(TLEFT .GT. 0.) THEN
         ITRUCK(NUMTK,7) = TLEFT
         RETURN
      END IF
C
C**** FAILURE OCCURS THIS TRANSIT
C     TIME TO REPAIR IS LOG NORMALLY DISTRIBUTED
      XMTTR = ITYPE(ITKTYP, 6)
      XMU = .5 * ALOG((XMTTR * XMTTR) / 2.)
      SIGMA = SQRT(ALOG((XMTTR * XMTTR) / (XMTTR * XMTTR) + 1.))
      U1 = RANF(DUM)
      U2 = RANF(DUM)
      X1 = ((-2 * ALOG(U1)) ** .5) * COS(2 * 3.14159 * U2)
      DELAY = EXP(SIGMA * X1 + XMU)
      IF(DELAY .LT. 60.)DELAY = 60.
      IF(ITRUCK(NUMTK,3) .EQ. 0)DELAY = 60. @ RELOAD FAILURE
C**** COMPUTE TIME TO NEXT FAILURE(EXPONENTIAL DISTRIBUTION)
      XMTBF = ITYPE(ITKTYP,5)
      UNRN = RANF(DUM)
      ITRUCK(NUMTK,7) = (-XMTBF*ALOG(1-UNRN))
C
C**** WRITE MESG FOR LOST TRUCK
      WRITE(LUOUT,5) NUMTK,TIME,INT(DELAY)
 5    FORMAT(' TRUCK NUMBER',I5,' FAILED AT ',F8.1,' FOR',I5,' MINUTES')
      ITRUCK(NUMTK,3) = 6
      ITRUCK(NUMTK,8) = ITRUCK(NUMTK,8) + 1        @ FAILURE COUNTER
      RETURN
      END
```

```
hh.      SUBROUTINE PUTEVT
          SUBROUTINE PUTEVT(IEVT, ITH, ITS, ICHECK)
    C
    C PUTEVT PLACES AN EVENT RECORD IN THE QUEUE IN CHRONOLOGICAL
    C ORDER AND UPDATES THE QUEUE DIRECTORY. ICHECK FLAG SET
    C IF INSERT WAS UNSUCCESSFUL.
    C
    C A LINEAR SEARCH IS DONE, EITHER FROM THE BACK FORWARD
    C OR FROM THE FRONT BACKWARD(WHICH EVER IS CLOSER TO THE
    C EVENT TIME), TO INSERT THE EVENT.
    C
    C      BOB DAVISON    1978
    C
          INCLUDE EVENTS,LIST
          DIMENSION IEVT(5),JFORE(2048),JBACK(2048),JTIME(2048,2)
          EQUIVALENCE (JFORE(1),JEVDS(1,1)),(JBACK(1),JEVDS(1,2)),
         Z (JTIME(1,1),JEVDS(1,3)),(JSTAT(1),JFIRST),(JSTAT(2),JLAST),
         Z (JSTAT(3),JEMPTY),(JSTAT(4),NUMEVT),(JSTAT(5),NEMPTY),
         Z (JSTAT(6),MAXEVT)
    C CHECK IF SPACE AVAILABLE .. IF NONE, RETURN
          ICHECK = 2048 - NEMPTY
          IF(NEMPTY.LE.0) GOTO 400                @ RETURN
          ICHECK=0
          LSAVE=JFORE(JEMPTY)
    C PUT EVENT RECORD IEVT IN IEVS
          DO 20 IN = 1,5
             IEVS(IN,JEMPTY) = IEVT(IN)
       20 CONTINUE
    C IF NO EVENTS IN QUEUE, PERFORM THE FOILOWING
          IF(NUMEVT.GE.1) GOTO 200
          JFORE(JEMPTY)=0
          JBACK(JEMPTY)=0
          JFIRST=JEMPTY
          JLAST=JEMPTY
          GOTO 380
    C IF ONE EVENT IN QUEUE, PERFORM THE FOLLOWING
     200  CONTINUE
          ITFH=JTIME(JFIRST,1)
          ITFS=JTIME(JFIRST,2)
          IF(NUMEVT.GT.1) GOTO 300
    C IF LOWEST TIME EVENT, PERFORM THE FOLLOWING
          IF(ITH.GT.ITFH)GO TO 210
          IF(ITH.EQ.ITFH.AND.ITS.GE.ITFS)GO TO 210
          JFORE(JEMPTY)=JFIRST
          JBACK(JEMPTY)=0
          JBACK(JFIRST)=JEMPTY
          JLAST=JFIRST
          JFIRST=JEMPTY
          GOTO 380
    C
    C ELSE THIS TIME IS EQUAL TO OR LATER THAN THE LAST EVFNT
     210  CONTINUE
          JFORE(JEMPTY)=0
          JBACK(JEMPTY)=JFIRST
```

```
      JLAST=JEMPTY
      GOTO 380
C
C IF TWO OR MORE EVENTS IN QUEUE, PERFORM THE FOLLOWING
 300  CONTINUE
C IF EVENT TIME IS LESS THAN FIRST EVENT, MAKE IEVT THE FIRST EVENT
      IF(ITH.GT.ITFH)GO TO 310
      IF(ITH.EQ.ITFH.AND.ITS.GE.ITFS)GO TO 310
      JFORE(JEMPTY)=JFIRST
      JBACK(JEMPTY)=0
      JBACK(JFIRST)=JEMPTY
      JFIRST=JEMPTY
      GOTO 380
C
C IF EVENT TIME IS GREATER THAN OR EQUAL TO LAST EVENT, MAKE IEVT LAST
310   CONTINUE
      ITLH=JTIME(JLAST,1)
      ITLS=JTIME(JLAST,2)
      IF(ITH.LT.ITLH)GO TO 320
      IF(ITH.EQ.ITLH.AND.ITS.LT.ITLS)GO TO 320
      JFORE(JEMPTY)=0
      JBACK(JEMPTY)=JLAST
      JFORE(JLAST)=JEMPTY
      JLAST=JEMPTY
      GOTO 380
C
C EVENT TIME IS BETWEEN JTIME(JFIRST) AND JTIME(JLAST)
 320  CONTINUE
      NUM=NUMEVT-1
C IF EVENT TIME CLOSER TO FIRST, START SEARCH AT FIRST EVENT
      IF((ITH-ITFH)-(ITLH-ITH))326,325,350
325   IF((ITS-ITFS)-(ITLS-ITS))326,326,350
326   IND1=JFIRST
      IT1H=ITFH
      IT1S=ITFS
      IND2=JFORE(JFIRST)
      IT2H=JTIME(IND2,1)
      IT2S=JTIME(IND2,2)
      DO 330 I=1,NUM
         IF(ITH.GT.IT2H)GO TO 327
         IF(ITH.EQ.IT2H.AND.ITS.GE.IT2S)GO TO 327
         GO TO 340
327      IND1=IND2
         IT1H=IT2H
         IT1S=IT2S
         IND2=JFORE(IND2)
         IT2H=JTIME(IND2,1)
         IT2S=JTIME(IND2,2)
 330  CONTINUE
      ICHECK=2
      GOTO 400                                  @ RETURN
 340  JFORE(IND1)=JEMPTY
      JBACK(JEMPTY)=IND1
      JFORE(JEMPTY)=IND2
      GOTO 380
C
C EVENT TIME CLOSER TO LAST, START SEARCH AT LAST EVENT
 350  IND1=JLAST
      IT1H=ITLH
      IT1S=ITLS
      IND2=JBACK(JLAST)
      IT2H=JTIME(IND2,1)
      IT2S=JTIME(IND2,2)
      DO 360 I=1,NUM
         IF(ITH.LT.IT2H)GO TO 355
         IF(ITH.EQ.IT2H.AND.ITS.LT.IT2S)GO TO 355
         GO TO 370
355      IND1=IND2
         IT1H=IT2H
         IT1S=IT2S
         IND2=JBACK(IND2)
         IT2H=JTIME(IND2,1)
         IT2S=JTIME(IND2,2)
 360  CONTINUE
      ICHECK=2
      GOTO 400                                 @ RETURN
 370  JFORE(IND2)=JEMPTY
      JBACK(JEMPTY)=IND2
      JFORE(JEMPTY)=IND1
      JBACK(IND1)=JEMPTY
C
C PERFORM THE FOLLOWING FOR ALL EVENTS
 380  CONTINUE
      JTIME(JEMPTY,1)=ITH
      JTIME(JEMPTY,2)=ITS
      NUMEVT=NUMEVT+1
      NEMPTY=NEMPTY-1
      JEMPTY=LSAVE
C
 400  RETURN
      END
```

ii. SUBROUTINE PUTQUE

```
      SUBROUTINE PUTQUE (ITEM, NUMQUE)
C**** PUTS ITEM IN QUEUE NUMQUE
C
C     CALLED BY ASPAR1, ASPAR2, ASPARV, ATPAR1, ATPAR2, ATPARV, CSAARV,
C               DEPASP, FINTK, LDPWDR, SERVER, UNTARV
C               (IN EDIT PROGRAM: EDIT, PRINT, TRKPUT)
C**** H. JONES    DEC 78
      INCLUDE LOG,LIST
      INCLUDE QUENUM,LIST
      INCLUDE QUEPNT,LIST
      IF(NUMQUE.LT.1.OR.NUMQUE.GT.176)THEN
         PRINT*,' BAD QUEUE# IN PUTQUE...ITEM NOT PUT IN QUEUE'
         RETURN
      END IF
C
C **  LOOP FOR ALL QUEUES
      DO 40 I = 1,176
         IPOINT = IHEAD(I)
C **     LOOP FOR ALL ITEMS IN QUEUE
   20    CONTINUE
         IF(IPOINT .EQ. 0)THEN
C           ** EXIT LOOP
            GO TO 30
         END IF
         IF(IPOINT .EQ. ITEM)THEN
            WRITE(6,100)ITEM,I,TIME
  100      FORMAT(' TRUCK',I5,' IS ALREADY IN QUEUE',I4,' AT TIME',F8.1)
            RETURN
         END IF
         IPOINT = ITEMS(IPOINT)
         GO TO 20
   30    CONTINUE
C **     END LOOP
   40 CONTINUE
C **  END LOOP
C
      IOLDH = IHEAD(NUMQUE)
      IHEAD(NUMQUE) = ITEM
      ITEMS(ITEM) = IOLDH
C
      RETURN
      END
```

jj. SUBROUTINE QINIT

```
      SUBROUTINE QINIT
C
C     INITIALIZE THE EVENT QUEUE(EMPTY) AT THE START
C     OF FIRST CI.
C     CALLED FROM MAINARM
C
C      BOB DAVISON
C
      INCLUDE EVENTS,LIST
      DIMENSION JFORE(2048),JBACK(2048),JTIME(2048,2)
      EQUIVALENCE (JFORE(1),JEVDS(1,1)),(JBACK(1),JEVDS(1,2)),
     Z (JTIME(1,1),JEVDS(1,3)),(JFIRST,JSTAT(1)),(JLAST,JSTAT(2)),
     Z (JEMPTY,JSTAT(3)),(NUMEVT,JSTAT(4)),(NEMPTY,JSTAT(5)),
     Z (MAXEVT,JSTAT(6)),(JTIME(1,2),JEVDS(1,4))
C
      NUMEVT=0
      NEMPTY = 2048
      JFIRST=0
      JLAST=0
      JEMPTY=1
      DO 100 I=1,NEMPTY
         JFORE(I)=I+1
         JBACK(I)=I-1
         JTIME(I,1)=0
         JTIME(I,2)=0
 100  CONTINUE
      JFORE(NEMPTY)=0
      JBACK(1)=0
      PRINT*,' QINIT'
C
      RETURN
      END
```

kk. SUBROUTINE RDIEXO

```
      SUBROUTINE RDIEXO(NUNIT)
C
C     UPDATES IUNIT EACH PULSE OF A MULTI-DEMAND AND SCHED DEMAND
C
C     CALLED BY DEMAND
C     CALLS     SCHED
C     SCHEDULES DEMAND (FOR NEXT PULSE)
C
C     JIM FOX - FEB 1979
      INCLUDE LOG,LIST
C
C     LOCAL VARIABLES
C     NUNIT - UNIT NUMBER
C     NCELLS - NUMBER OF DEMAND PULSES IN DEMAND UNIT RECORD
C     NMDEAD - NUMBER OF WEAPONS KILLED
C     NDEDRD - NUMBER OF DEAD ROUNDS, LOST WHEN WPN KILLED
C     NMRD   - NUMBER OF ROUNDS
C     NUMPL  - NUMBER OF THE PULSE
C     NCELLS - NUMBER OF PULSES PER CI
C
      DIMENSION IPARM(5)
      DO 5 I = 1,5
         IPARM(I) = 0
    5 CONTINUE
C     SET IPARM TO CALL TO SCHEDULE DEMAND
      IPARM(1) = NUNIT
C     FIND NUMBER OF DEMAND PULSE CELLS
      NCELLS = IUNIT(NUNIT,139)
      IF(NCELLS.LE.1) GO TO 10
C     COMPUTE THE TIME OF THE NEXT DEMAND EVENT AND SCHEDULE IT.
      TOTIM  = TIME + TCILNG / NCELLS
      IF(TOTIM  .GT. TCIST + TCILNG)GO TO 10
      CALL SCHED(1,IPARM,TOTIM )                @ DEMAND
   10 CONTINUE
      IF(NCELLS.LE.1) NCELLS=1
C     UPDATE IUNIT WITH A PART OF THE DEMAND DATA
C
      DO 100 I = 1,LPPAR(6)
      IND = I * 13 - 5
C     IF NO DATA TO UPDATE GO TO 100
      IF(IUNIT(NUNIT,IND+10) .LE. 0)GO TO 100
C     COMPUTE WHICH PULSE THAT THIS UPDATE REPRESENTS
      NUMPL = (TIME - TCIST) / (TCILNG / NCELLS) + .5
      IF(NCELLS.LE.1) NUMPL=1
C     COMPUTE NEGATIVE SURVIVOR FACTOR
C     LOWER NUMBER OF SURVIVORS FOR THIS PULSE
C     COMPUTE THE NUMBER OF DEAD TO BE ASSESSED THIS PULSE - NMDEAD
      NMDEAD = (IUNIT(NUNIT,IND+9)+NUMPL-1) / NCELLS
C
C     COMPUTE NUMBER OF RNDS LOST WITH DEAD WPN
      IF(IUNIT(NUNIT,1). EQ. 8)THEN
        NDEDRD = IUNIT(NUNIT,IND + 7)*NMDEAD
      ELSE
      END IF
C     IF NEG. ROUNDS ON HAND - NONE LOST.
      IF(IUNIT(NUNIT,IND+4) .LE. 0) NDEDRD = 0
      IUNIT(NUNIT,IND+1) = IUNIT(NUNIT,IND+1) - NMDEAD
      IF(IUNIT(NUNIT,IND+1).LT.0) IUNIT(NUNIT,IND+1)=0
C**** ASSUME SINGLE PULSE UNIT
      IUNIT(NUNIT,IND+2)=IUNIT(NUNIT,IND+10)
C**** CHECK FOR ARTY UNITS
      IF(IUNIT(NUNIT,1).GE.4.AND.IUNIT(NUNIT,1).LE.6) IUNIT(NUNIT,IND+2)
     Z = IUNIT(NUNIT,IND+1)
C     IF FARP, NUMBER OF WEAPONS SHORT AMMO = NUM IN CELL
      IF(IUNIT(NUNIT,1) .EQ. 8)IUNIT(NUNIT,IND+2) = IUNIT(NUNIT,IND+2)
     Z    + (IUNIT(NUNIT,IND+10) + NUMPL - 1) / NCELLS
C
C     UPDATE A PORTION OF ROUNDS SHORT
C     COMPUTE THE NUMBER OF ROUNDS SHORT TO BE ASSESSED THIS PULSE-NMRD
      NMRD = (IUNIT(NUNIT,IND+11) + NUMPL - 1)  / NCELLS
      IUNIT(NUNIT,IND+3)=IUNIT(NUNIT,IND+3)+NMRD-(IUNIT(NUNIT,IND+7)
     Z  *NMDEAD - NDEDRD)
C     COMPUTE AMMO ON HAND
      IUNIT(NUNIT,IND+4) = IUNIT(NUNIT,IND+4) - (NDEDRD + NMRD)
  100 CONTINUE
C
      RETURN
      END
```

11.

```
      SUBROUTINE RDJIFF
C
C      READS OUTPUT FILE CREATED BY JIFFY.
C     TRANSLATES THE JIFFY IDS TO ARM NUMBERS
C     SCHEDULES A DEMAND EVENT FOR EACH UNIT FIRING AMMO.
C     UPDATES IUNIT FOR SINGLE PULSE DEMAND UNITS.
C
C      ANN HILLS-APRIL 1983
C
C     LOCAL VARIABLE DEFINITION
C     IRDJF - JIFFY CREATED INTERFACE REC 64 WS LONG PER REC
C       1 - JIFFY UNIT ID
C       2 - NUMBER OF AH IN CELL(AH ONLY
C       3 - ARM AMMO CODE
C       4 - NUMBER OF WEAPONS ALIVE
C       5 - NUMBER OF WEAPONS SHORT AMMO
C       6 - TOTAL NUMBER OF ROUNDS SHORT
C       7-11  ECT  REPEAT OF 2 - 6
C      IREC--RECORD NUMBER OF FILE 9 EQUIVILANT TO ARM UNIT NO.
C     IAUN - LOOP INDEX
C     IND1 - COMPUTED INDEX TO ACCESS IUNIT AMMO TYPE
C     IAMMO - AMMO TYPE FROM IUNIT
C     IJF - LOOP INDEX
C     IJAM - IRDJF AMMO TYPE
C     I - LOOP INDEX
C     III - LOOP INDEX
C     IIJ - LOOP INDEX
C     IJF - LOOP INDEX
C     IU - LOOP INDEX
C     IAUN - LOOP INDEX
C     IND1 - INDEX COMPUTED FROM IAUN TO ACCESS IUNIT FOR AMMO TYPE
C     IA LOOP INDEX
C     IAMM - AMMO TYPE FROM IRDJF
C     IJAM - AMMO TYPE FROM IRDJF
C     IUA - COMPUTED INDEX FROM IU TO ACCESS IUNIT
C     IUAM - AMMO TYPE FROM IUNIT
C     NHELIC - ACCUMULATOR FOR NUMBER OF HELICOPTERS IN CELLS
C     NNI - INDEX TO ACCESS IRDJF,2,7,12 ECT
C     NRNSH - ACCUMULATOR FOR NUMBER OF ROUNDS SHORT
C     NAPNAL - ACCUMULATOR FOR NUMBER OF AH RETURNING ALIVE
C     NWPNSH - ACCUMULATOR FOR NUMBER OF AH SHORT ROUNDS
C     NCELLS - NUMBER OF CELLS IN FARP RECORD
C     DELTIM - TIME INTERVAL BETWEEN FARP CELL PROCESSING
C     IIL - COMPUTED INDEX TO FILL IDMOUT
C     IIJ - COMPUTED INDEX TO FIND IRDJF TO BUILD IDMOUT RECORD
C     TOTTIM - TIME TO SCHEDULE EVENT
C
      include ica.list
      DIMENSION IRDJF(30),IPARM(5)
      DEFINE FILE 9(75,30,U,ITD)
      DO 10 I =1,5
      IPARM(I) = 0
   10 CONTINUE
C**** ZERO LAST EVENT'S DEMAND,WEAPONS KILLED,AND WEAPONS SHORT
```

```
      DO 40 I1 = 1,75
C**** LOOP FOR 10 AMMO'S
      DO 30 I2 = 1,LPPAR(6)
C**** LOOP FOR THREE ELEMENTS
      DO 20 I3 = 1,3
C**** COMPUTE THE FUN INDEX
      I4 = 3 + I2 * 13 + I3
      IUNIT(I1,I4) = 0
   20 CONTINUE
   30 CONTINUE
   40 CONTINUE
C
C       READ RECORD FROM DEMAND FILE AND PREPARE IUNIT ARRAYS,ETC
C      NOTE!!!!!!!!!!!!!!!!!! THIS OUTSIDE LOOP GOES THROUGH ALL
C       THE RECORDS MATCHING RECORD NUMBER TO ARM UNIT NUMBER
      DO 500 IREC=1,75
      READ(9'IREC) (IRDUF(J),J=1,30)
C          CHECK FIRST FOR ANY DEMAND IN UNIT...IFLAG SHOWS DEMAND
C
      IFLAG=0
      DO 60 I=5,31,5
      IF(IRDUF(I).NE.0)IFLAG=IFLAG+1
60    CONTINUE
      IF(IFLAG.EQ.0)GO TO 500   @THIS MEANS NO DEMAND GET NEXT RECORD
C * * * ADD AMMO DEMAND TO ICSA(3,1-30) BY AMMO TYPE
      DO 65 I = 1,31,5
         IF(IRDUF(I) .EQ. 0)GO TO 65
         ICSA(3,IRDUF(I+1)) = ICSA(3,IRDUF(I+1)) + IRDUF(I+4)
  65  CONTINUE
C
C        THIS PORTION OF THE PROGRAM NOW LOOKS TO SEE IF
C        UNIT HAS MORE THAN ONE PULSE PER CI,AND CALLS
C        THE CORRECT SUBROUTINE FOR ADJUSTING THE IUNIT ARRAYS
C        WITH INFORMATION OUT OF DEMAND FILES.  THEN THE PROGRAM
C        SCHEDULES A DEMAND EVENT TO ALLOW RELOAD OF WEAPONS
C
C
      IPARM(1)=IREC
      IF(IUNIT(IREC,139).GT.0)THEN
C      CHECK TO SEE IF AVIATION
C
C
        IF(IUNIT(IREC,1).EQ.9)THEN
           CALL HELIRD(IFF,ADDTIM)
         ELSE
C
C
C     IF NOT AVIATION,MUST BE ARTILLERY
            CALL ARTYRD(IFF,ADDTIM)
         END IF
C
      ELSE
         CALL ONERD(IFF,ADDTIM)
      END IF
C
C
C       NOW CHECK VALUE OF IFF TO DETERMINE NEED TO SCHEDULE DEMAND
C
C
```

```
            IPARM(1)=IRED
            TOTTIM=TIME+ADDTIM
            CALL SCHED(1,IPARM,TOTTIM)
         END IF
C**********THIS ENDS RECORD,GET NEXT RECORD
C
500      CONTINUE
  260 FORMAT('  HAVE FINISHED RDJIFF ')
         RETURN
C
C       END MAIN PROGRAM
C
C
C
C
C
         SUBROUTINE DMERD(IFF,ADDTIM)
C
C          THIS SUBROUTINE READS IN DEMAND FOR SINGLE PULSE UNITS
C          IFF IS A FLAG USED IN MAIN PROGRAM TO DETERMINE WHETHER
C          A DEMAND EVENT SHOULD BE SCHEDULED(IFF=0 MEANS NO).......
C          ADDTIM CARRIES THE TIME FOR SCHEDULING DEMAND.
C
         IFF=0
  120 DO 160 IAUN = 1,LPPAR(6)   !LOOP FOR IUNIT AMMO CODES
            IND1 = 12 * IAUN - 5
            IAMMO = IUNIT(IRED,IND1)
            IF(IAMMO .EQ. 0)GO TO 160
            DO 140 IJF = 1,30,5    !LOOP FOR DEMAND FILE AMMO CODES
               IJAM = IRDJF(IJF)
C
C
C              SCENARIO DEPENDENT CODE TO READ IN SECOND AMMO CODE 2
               IF(IJAM .EQ. 25 .AND. IAUN .EQ. 3)GO TO 130
C
C
C              IF THIS AMMO CODE DOES NOT MATCH IUNIT,TRY NEXT ONE
               IF(IJAM .NE. IAMMO .OR. IJAM .EQ. 0)GO TO 140
C              HAVE EQUAL AMMO TYPES, UPDATE IUNIT WITH NEW DATA.
C****          UPDATE FOR DEMAND DATA IN UNIT STATUS REPORT
  130          IUNIT(IRED,IND1+9) = IUNIT(IRED,IND1+1) - IRDJF(IJF+1)
               IF(IUNIT(IRED,IND1+1).LT.IRDJF(IJF+1))IUNIT(IRED,IND1+1)=
     *         IRDJF(IJF+1)
               IF(IUNIT(IRED,IND1+9) .LT. 0)IUNIT(IRED,IND1+9) = 0
               IUNIT(IRED,IND1+10) = IRDJF(IJF+3)
               IUNIT(IRED,IND1+11) = IRDJF(IJF+4)
               IRDJF(IJF) = 0
               IFF=1
C
C              END OF IUNIT UPDATE FOR THIS AMMO TYPE
               GO TO 160
  140       CONTINUE
C        NO UNIT AMMO MATCH
            WRITE(LLOUT,150) IRED,IJAM
  160 CONTINUE
      IF(IFF.LE.0)RETURN
C
      ADDTIM  =  TCIST +  TCILNG -.5
      RETURN
C      END SUBROUTINE ONERD
C
C
C
C
C
C
C
      SUBROUTINE HELIRD(IFF,ADDTIM)
C
C         THIS SUBROUTINE UPDATES IUNIT ARRAYS FOR AVIATION
C         UNITS AND SETS FLAG IFF TO SCHEDULE DEMAND EVENT;
C         ADDTIM IS CALCULATED TIME FOR EVENT TO BE SCHEDULED.
C
C
C
  190 DO 200 IIJ = 8,21,13    @LOOP ON TWO IUNIT AMMO TYPES
         NCELLS=0
         NHELCL=0
         NWPNAL=0
         NWPNSH=0
         NRNSH=0
         DO 212 NNI=4,30,5
            IF(IRDJF(NNI).LE.0)GO TO 212  @NO HELICOPTERS IN CELL
            IF(IRDJF(NNI-3).NE.IUNIT(IREC,IIJ))GO TO 212 @NO AMMO MATCH
            NCELLS=NCELLS +1
            NHELCL=NHELCL + IRDJF(NNI)
            NWPNAL=NWPNAL + IRDJF(NNI-2)
            NWPNSH=NWPNSH + IRDJF(NNI-1)
            NRNSH=NRNSH+IRDJF(NNI+1)
212      CONTINUE
C
C         IF NO CELLS, SCHEDULE NO DEMAND EVENTS
         IF(NCELLS.LE.0)THEN
            IFF=0
            RETURN
         END IF
c        compute time between demand pulses
         ADDTIM=TCILNG/NCELLS
c        update number of demands for this farp
         IUNIT(IREC,139)=NCELLS
c        take care of the single farp
         IF(NCELLS.LE.1)ADDTIM=TCILNG/2.
c        update holding area in unit
         IUNIT(IREC,IIJ+9)=NHELCL
         IUNIT(IREC,IIJ+10) = NWPNSH
         IUNIT(IREC,IIJ+11) = NRNSH
         IF(IIJ.GT.8 .AND.IFF.GT.0)GO TO 200
C           SET FLAG AND TIME FOR DEMAND EVENT
```

```
         IFF=1
         RETURN
 200  CONTINUE
C
C
C
C
C
      SUBROUTINE ARTYRD(IFF,ADDTIM)
C
C         THIS SUBROUTINE MODIFIES IUNIT ARRAYS FOR ARTILLERY
C         UNITS AND SETS FLAG FOR DEMAND EVENT,AND SETS ADDTIM
C         TO SHOW TIME TO SCHEDULE THE EVENT
 210  ADDTIM = TCIST + 60.
      IFF=1
C     FIND AMMO TYPES TO UPDATE IUNIT HOLDING FOR ARTY
      IUNIT(IREC,139) = INT(TCILNG / 60. + .5)
      DO 240 IA = 1,30,5
C     SELECT AMMO RECORD FROM IRDJF
      IAMM = IRDJF(IA)     @THIS IS AMMO TYPE FROM DEMAND FILE
      IF(IAMM.EQ.0)GO TO 240    @NO AMMO TYPE GET NEXT ONE
C     FIND CORRESPONDING UNIT AMMO
         DO 220 IU = 1,LPPAR(6)
            IUA = 13 * IU - 5
            IUAM = IUNIT(IREC,IUA)    @THIS IS AMMO TYPE FROM IUNIT ARR
         IF(IUAM.EQ.0)GO TO 220   @AMMO TYPE 0 GET NEXT ONE
C           IF NOT THE SAME AMMO GO TO 220
            IF(IUAM .NE. IAMM)GO TO 220
C           HAVE AMMO MATCH.  SET UP FILE IUNIT.
            IUNIT(IREC,IUA+9)= IUNIT(IREC,IUA+1) - IRDJF(IA+1)
            IF(IUNIT(IREC,IUA+1).LT.IRDJF(IA+1))IUNIT(IREC,IUA+1)=
     $        IRDJF(IA+1)
            IF(IUNIT(IREC,IUA+9) .LT. 0)IUNIT(IREC,IUA+9) = 0
            IUNIT(IREC,IUA+10) = IRDJF(IA+2)
            IUNIT(IREC;IUA+11) = IRDJF(IA+3)
            GO TO 240
 220     CONTINUE
         WRITE (LUOUT,230)IREC,IA
 230     FORMAT('  NO IUNIT AMM MATCH - RDJIFF, UNIT ',I5,'  AMMO ',I5
         IFF=0
         RETURN
 240  CONTINUE
      RETURN
C
C        END SUBROUTINE ARTYRD
      END
```

```
mm.      SUBROUTINE READF
          SUBROUTINE READF (LU, NUM, INTGR, REAL, IWORD)
    C**** RETURNS UP TO NUM INTEGERS, REALS, AND STRINGS.
    C**** BLANKS AND COMMAS ARE DELIMITERS.  READS FROM TERMINAL.
    C**** H. JONES    1979
    C
          CHARACTER*(*) IWORD
          CHARACTER*1 IBLANK,IPERD,ICOMMA,IMINUS,IQUOT,IALDIG,ICHR
          DIMENSION INTGR(NUM), REAL(NUM), IWORD(NUM)
          DIMENSION ICHR(82), IALDIG(10)
          DATA IBLANK /' '/, IPERD /'.'/, ICOMMA /','/, IMINUS /'-'/
          DATA IQUOT/''''/
          DATA IALDIG /'1','2','3','4','5','6','7','8','9','0'/
          ICHR(81) = IBLANK
          ICHR(82) = IQUOT
    C
    C**** READ RECORD, ZERO OUT OLD INTGR, REAL, IWORD
          READ(LU,210,END= 190) (ICHR(I), I=1,80)
          DO 10 I=1,NUM
             INTGR(I)=0
             REAL(I)=0.
       10 IWORD(I) = IBLANK
          KWORD=0
          KINTGR=0
          KREAL=0
          N=0
    C
    C**** CHECK NEXT CHARACTER IN RECORD
    C**** SKIPPING BLANKS **********
       20 MINUS = 1
       30 N=N+1
          IF(N.EQ.81) GO TO 190
          IF(ICHR(N).EQ.IBLANK) GO TO 30
    C
    C**** DETERMINE IF CHAR IS NUMBER OR ALPHA
          IF(ICHR(N) .EQ. IQUOT) GO TO 160
          IF(ICHR(N) .NE. IMINUS) GO TO 40
          MINUS = -1
          GO TO 30
       40 ISTART = N
          NUMB=0
          IF(ICHR(N).EQ.IPERD) GO TO 90
          DO 50 I=1,10
             IF(ICHR(N).EQ.IALDIG(I)) GO TO 60
       50 CONTINUE
          GO TO 150
    C
    C**** BUILDING INTEGER OR INTEGER PART OF REAL
       60 N=N+1
          IF(ICHR(N) .NE. IBLANK  .AND.  ICHR(N) .NE. IPERD
         $  .AND.  ICHR(N) .NE. ICOMMA ) GO TO 60
    C
    C**** CALCULATE VALUE OF INTEGER
          IEND = N-1
```

```
      DO 80 I=ISTART,IEND
         DO 70 J=1,9
            IF(ICHR(I) .EQ. IALDIG(J)) GO TO 80
   70    CONTINUE
         J=0
   80 NUMB = NUMB +  J * 10 **(IEND-I)
      IF(ICHR(N) .EQ. IPERD) GO TO 90
C
C**** NUMBER WAS INTEGER, STORE IT, CHECK FOR BLANKS
      KINTGR = KINTGR +1
      INTGR(KINTGR) = NUMB * MINUS
      GO TO 20
C
C**** NUMBER WAS INTEGER PART OF REAL, NOW BUILD DECIMAL.
   90 RNUMB = FLOAT(NUMB)
      ISTART = N+1
      IF(ICHR(ISTART) .EQ. IBLANK) GO TO 140
  100 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NF.ICOMMA ) GO TO 100
C
C**** CALCULATE VALUE OF DECIMAL
      IEND = N-1
      IDECPL = 1
      NUMB=0
      DO 130 I=ISTART,IEND
         DO 110 J=1,9
            IF(ICHR(I) .EQ. IALDIG(J)) GO TO 120
  110    CONTINUE
         J=0
  120    NUMB = NUMB + J * 10**(IEND-I)
  130 IDECPL = IDECPL * 10
C
C**** ADD INTEGER AND DECIMAL
      DECML=FLOAT(NUMB)/IDECPL
      RNUMB = RNUMB + DECML
  140 KREAL = KREAL + 1
      REAL(KREAL) = RNUMB * MINUS
      GO TO 20
C
C**** BUILDING STRING ALPHANUMERIC
  150 N=N+1
      IF(ICHR(N).NE.IBLANK .AND. ICHR(N).NE.ICOMMA ) GO TO 150
      GO TO 180
  160 ISTART = N+1
  170 N=N+1
      IF(ICHR(N) .NE. IQUOT) GO TO 170
  180 IEND = N-1
      KWORD = KWORD + 1
      LENSTR = IEND - ISTART + 1
      IF(LENSTR .GT. 10) LENSTR = 10
       ENCODE(LENSTR,200, IWORD(KWORD))  (ICHR(J), J=ISTART, IEND)
      GO TO 20
C
  190 RETURN
```

```
210 FORMAT(80A1)
    END
```

nn.   SUBROUTINE RELOAD

```
      SUBROUTINE RELOAD (IPARM)
C**** EVENT RELOAD  --  REPLACES ROUNDS OF AMMO AT UNIT WEAPONS.
C     EVENT TYPE 2
C     CALLED BY MAINARM
C     CALLS      IQ, DUALMX, FINTK, INTRDK, SCHED, OPERA
C
C**** D. HILLIS      JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- 0 IF SCHED FROM DEMAND, TRK# IF SCHED FROM UNTARV
C
C     SCHEDULES --  UNTDEP, DEPARTURE OF UNIT TRUCKS
C                   UNTARV, ARRIVAL OF TRUCKS AT UNIT.
C                   ASPARV, EMPTY TRUCKS -> ASP
C     SCHEDULED BY  DEMAND OR UNTARV
C
C     RELOAD WILL OCCUR AT THE TASK FORCE LEVEL FOR MANEUVER UNITS,
C     BATTERY LEVEL FOR ARTILLERY UNITS AND ADA UNITS, AND AT
C     BATTALION FARRP'S.  THE RELOAD WILL BE CALLED FROM THE DEMAND
C     EVENT.
C
C
C     AMMO WILL BE CONSOLIDATED ON TRUCKS AT UNIT.  NO MORE THAN 1 TRUCK
C     PER UNIT (PER TYPE OF AMMO) WILL BE AT LESS THAN FULL LOAD WHILE
C     LOCATED AT THE UNIT. A 'SMALL LOAD' THRESHOLD MAY BE DEFINED BELOW
C     WHICH AMMO IS DUMPED TO GROUND TO ALLOW TRUCK TO RETURN TO ATP.
C
C**** LOCAL VARIABLE DEFINITION
C**** K - UNIT AMMO INDEX
C**** TOTIM  - TIME OF SCHEDULED EVENT
C**** DELAY - TIME TO RELOAD WEAPONS AT THE UNIT
C**** LOAD - NUMBER OF ROUNDS ON THE TRUCK
C**** ND - AMMO DEMAND
C**** NUMTK - TRUCK NUMBER
C**** NEWLD - TRUCK LOAD ON AMMO DEMAND
C**** MX - AMMO MIX INDEX
C**** IAM - AMMO TYPE
C**** KIND - EVENT TYPE
C**** TMIND - DELAY TIME DUE TO INTERDICTION
C**** NRPW - NUMBER OF ROUNDS PER WEAPON
C**** NW - NUMBER OF WEAPONS LOADED PER TRUCK
C**** IPLOAD - PARTIAL LOAD
C**** IFLAG - 0 -FARP TRUCK AVAIL., 1 -NO FARP TRUCK AVAIL.
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
      NUNIT = IPARM(1)
      IUNITQ = IQ(1,NUNIT)
C**** SELECT AN AMMO TYPE
      DO 180 KK=1,LPPAR(6)
      K=13 * KK - 5
      IAM = IUNIT(NUNIT,K)
      IF(IAM .EQ.0) GO TO 180
      IF(IUNIT(NUNIT,K+8) .LE. 0)GO TO 180
C**** IF THE UNIT HAS MORTARS AND BUSHMASTERS USE RELOAD ROUTINE DUALMX
C**** !!!! THE NEXT LINE ASSUMES THAT MORTARS AND BUSH. GO TOGETHER
      IF(IAM .EQ. 16) THEN
         CALL DUALMX(NUNIT,K,K+13)
         RETURN
      END IF
C
C**** CALCULATE AMMO DEMAND
  10  ND = IUNIT(NUNIT,K+7) * IUNIT(NUNIT,K+1) - IUNIT(NUNIT,K+4)
      IF(IUNIT(NUNIT,1).EQ.8) ND=IUNIT(NUNIT,K+3)
      IF(IUNIT(NUNIT,1) .EQ. 8) GO TO 15
      IF(ND.LT.IUNIT(NUNIT,K+4) - IUNIT(NUNIT,K+2)  * IUNIT(NUNIT,K+5))
     $  GO TO 180
      IF(IAM .EQ. 10)THEN
         ND = (ND / 6) * 6
         IUNIT(NUNIT,K + 3) = IUNIT(NUNIT,K + 3) - ND
      END IF
  15  IF(ND .LE. 0)GO TO 180
C
      WRITE(LUOUT,20)IAM,ND
   20 FORMAT('  RELOAD AMMO TYPE',2I5,' ROUNDS')
C       PULL TRUCK FROM QUEUE
   30 CALL FINTK(IUNITQ,IAM,NUMTK,0)
      WRITE(LUOUT,40)NUMTK
   40 FORMAT('  RELOAD AFTER FINTK ',I5)
      IF(IUNIT(NUNIT,1).EQ.8.AND.NUMTK.EQ.0) GO TO 180
      IF(IUNIT(NUNIT,1).EQ.8) GO TO 90
      IF(NUMTK .EQ. 0)GO TO 180
C**** CHECK FOR INTERDICTION
      MX=ITRUCK(NUMTK,5)
      NOFF = (IMIX(MX,IAM) * ITRUCK(NUMTK,6) + 9999)/10000
      CALL INTRDK(NUMTK,TMIND)
      IF(TMIND .EQ. 0)GO TO 90
C
C**** ADD ONE TO THE NUMBER OF TRUCKS KILLED DURING RELOAD
      JUNIT(IUNIT(NUNIT,1),23) = JUNIT(IUNIT(NUNIT,1),23) + 1
      TOTIM  = TIME + TMIND
      IPARM(2) = NUMTK
      IPARM(3)=IUNIT(NUNIT,3)
      IPARM(4)=ITRUCK(NUMTK,5)
C**** SCHEDULE ASPARV FOR EMPTY TRUCK
      CALL SCHED(5,IPARM,TOTIM )               @ ASPARV
C
C**** DECREMENT UNIT AMMO ON TRUCKS
      IUNIT(NUNIT,K+8) = IUNIT(NUNIT,K+8) - NOFF
      IF (IUNIT(NUNIT,K+8).LT.0) IUNIT(NUNIT,K+8)=0
      ITRUCK(NUMTK,6) = 0
C**** THIS LOGIC IS HERE TO SOLVE THE PROBLEM OF WEAPON
C**** SYSTEMS HAVING DIFFERENT BASIC LOADS FOR THE SAME AMMO
      IF(IUNIT(NUNIT,1).NE.1 .AND. IUNIT(NUNIT,1).NE.2) GO TO 30
      IF(IUNIT(NUNIT,K).NE.2) GO TO 30
      DO 50 JJ=8,LPPAR(6) * 13 - 5,13
         IF(K.EQ.JJ) GO TO 50
   50 CONTINUE
C        NO EQUAL AMMO FOUND FOR 2 IN THIS UNIT GO TO 30
      GO TO 30
C
   60 IUNIT(NUNIT,JJ+8)=IUNIT(NUNIT,JJ+8)- NOFF
      IF(IUNIT(NUNIT,JJ+8).LT.0)IUNIT(NUNIT,JJ+8)=0
      GO TO 30
   90 MX = ITRUCK(NUMTK,5)
      ITRUCK(NUMTK,3) = 0
      IPARM(2) = NUMTK
C**** CALCULATE THE TRUCK AMMO LOAD
      LOAD = (IMIX(MX,IAM) * ITRUCK(NUMTK,6) + 9999) / 10000
      NRPW = ND / IUNIT(NUNIT,K+2)
C**** CALCULATE THE NUMBER OF WEAPONS LOADED PER TRUCK
      NW = MINO(LOAD / NRPW,IUNIT(NUNIT,K+2))
C**** CALCULATE THE TRAVEL TIME
      TVLTIM = 2 * IRSTME(IAM,3) + (NW + 1) * IRSTME(IAM,1)
      CALL OPERA(NUMTK,TVLTIM,TFAIL)
      IF(TFAIL .GT. 0)THEN
         IPARM(3) = 0
         IPARM(4) = 666
         CALL SCHED(8,IPARM,TIME + TFAIL)       @ UNTARV
         GO TO 30
      END IF
      DELAY = TVLTIM + IRSTME(IAM,2) * NRPW/100
C**** CHECK AMMO DEMAND AGAINST TRUCK LOAD
      IF(MX.EQ.9)GO TO 92
      IF(ND .LT. LOAD)THEN
C****    CALCULATE THE PARTIAL LOAD OF THE TRUCK
         ITRUCK(NUMTK,6) = 10000 * (LOAD - ND)/IMIX(MX,IAM)
         NEWLD = ND
         KIND = 8
         GO TO 38
      END IF
C
   92 ITRUCK(NUMTK,6) = 0
      NEWLD = LOAD
      KIND = 3
      IF(MX.EQ.9)THEN
         DELAY = 20.
         NW = IUNIT(NUNIT,K+2)
      END IF
C
   38 TOTIM  = TIME + DELAY
C****   CHECK PARTIAL LOAD ON TRUCK
      IF (ITRUCK(NUMTK,6) .GT. 1000)GO TO 42
      IF(IUNIT(NUNIT,1) .EQ. 8 .AND. ITRUCK(NUMTK,6) .EQ. 0)GO TO 42
      IPLOAD = (IMIX(MX,IAM) * ITRUCK(NUMTK,6) + 9999)/10000
      IUNIT(NUNIT,K+4) = IUNIT(NUNIT,K+4) + IPLOAD
      IUNIT(NUNIT,K+8) = IUNIT(NUNIT,K+8) - IPLOAD
      IF(IUNIT(NUNIT,K+8).LT.0)IUNIT(NUNIT,K+8)=0
      KIND = 3
      ITRUCK(NUMTK,6) = 0
      IPARM(3) = 0
      TOTIM  = TOTIM  + (IRSTME(K,2) * IPLOAD/100)
C****   SCHEDULE A UNTARV OR UNTDEP DEPENDING ON VALUE OF KIND
   42 CALL SCHED(KIND,IPARM,TOTIM )              @ UNTDEP/UNTARV
C
      ITRUCK(NUMTK,11) = ITRUCK(NUMTK,11) + 1 @ RELOAD COUNTER
C**** ADD THE DELAY TO THE TOTAL RELOAD TIME SPENT BY THIS TYPE UNIT
      JUNIT(IUNIT(NUNIT,1),21) = JUNIT(IUNIT(NUNIT,1),21)
     Z   + (TOTIM  - TIME)
C**** ADJUST AMMO ON TRUCKS AND CURRENT AMMO SUPPLY
      IUNIT(NUNIT,K+8) = IUNIT(NUNIT,K+8) - NEWLD
      IF(IUNIT(NUNIT,K+8).LT.0)IUNIT(NUNIT,K+8)=0
C**** THIS LOGIC IS HERE TO SOLVE THE PROBLEM OF WEAPON
C**** SYSTEMS HAVING DIFFERENT BASIC LOADS FOR THE SAME AMMO
      IF(IUNIT(NUNIT,1).NE.1 .AND. IUNIT(NUNIT,1).NE.2) GO TO 130
      IF(IUNIT(NUNIT,K).NE.2) GO TO 130
      DO 110 JJ=8,LPPAR(6) * 13 - 5,13
         IF(K.EQ.JJ) GO TO 110
         IF(IUNIT(NUNIT,K).EQ.IUNIT(NUNIT,JJ)) GO TO 120
  110 CONTINUE
C
C     NO EQUAL AMMO 2 IN THIS UNIT GO TO 45
      GO TO 130
  120 IUNIT(NUNIT,JJ+8)=IUNIT(NUNIT,JJ+8)-NEWLD
      IF (IUNIT(NUNIT,JJ+8).LT.0)IUNIT(NUNIT,JJ+8)=0
  130 IUNIT(NUNIT,K+4) = IUNIT(NUNIT,K+4) + NEWLD
      IF(IUNIT(NUNIT,K+4) .LE. 0)WRITE(6,135)NUNIT,IUNIT(NUNIT,K),
     $  IUNIT(NUNIT,K+4),TIME
  135 FORMAT(' UNIT',I3,' AMMO',I3,' CUR SUP',I10,' AT TIME',F8.1)
C     DECREMENT THE NUMBER OF ROUNDS SHORT
      IUNIT(NUNIT,K+3) = IUNIT(NUNIT,K+3) - NEWLD
      IF(IUNIT(NUNIT,K+3) .LE. 0)IUNIT(NUNIT,K+3) = 0
      IF(IUNIT(NUNIT,K+4).GE.IUNIT(NUNIT,K+1)*IUNIT(NUNIT,K+7))
     $  IUNIT(NUNIT,K+3) = 0
      IUNIT(NUNIT,K+2) = IUNIT(NUNIT,K+2) - NW
      GO TO 10
  180  CONTINUE
C
      RETURN
      END
```

```
00.     SUBROUTINE REPORT
         subroutine report(iparm)
   C**** WRITES REPORTS OF VARIOUS TYPES.
   C     EVENT TYPE 17
   C     CALLED BY MAINARM, CONTRL
   C     CALLS     TRUCK
   C**** J FOX    FEB 79
         CHARACTER*10 AUNIT,IWPN, NAME, ISAVE
         include log,LIST
         include aunit,LIST
         DIMENSION IPARM(5),IWPN(22),Jtrks(8),IRTYPE(7)
   C
         DATA IWPN/'TANK','TOW','PWDR','155HE','155ICM','8inHE',
        $ '8inICM','8inPWDR','HELLFIRE','MLRS','155RAP','155CLGP','155SMK',
        $ '30mm(AAH)','8inRAP','MORTAR','BUSHMASTER','DIVAD','SMALLARMS',
        $ 'FUZES','155GB','8INGB'/
         DATA IRTYPE /1,1,1,1,1,1,1/
     15  CONTINUE
      10 FORMAT (' 1)    UNIT STATUS',/,
       Z       ' 2)   ATP STATUS',/,
       Z       ' 3)   ASP STATUS',/,
       Z       ' 4)   CSA STATUS',/,
       Z       ' 5)   ATP AMMO ISSUED',/,
       Z       ' 6)   ASP AMMO ISSUED',/,
       Z       ' 7)   TRUCK MOVEMENT ',/,
       Z       ' 8)   DEFAULT ',/,
       Z       ' 9)   ALL')
         NASP = 0
         NATP = 0
         IRPT = IPARM(1)
         IF(IRPT .LT. 1 .OR. IRPT .GT. 9) THEN
            WRITE(6,10)
            READ*,IRPT
         END IF
         IF (IRPT .EQ. 0) RETURN
         IF(IRPT .EQ. 9) THEN
            DO 20 I = 1,7
      20    IRTYPE(I) = 1
         END IF
         IF (IRPT .LE. 7) THEN
            DO 30 I = 1,7
      30    IRTYPE (I) = 0
            IRTYPE(IRPT) = 1
            IRPT = 0
         END IF
         IF(IRTYPE(1) .GE. 1) CALL RPT01(IRTYPE(1))
         IF(IRTYPE(2) .EQ. 1) CALL RPT02(NATP)
         IF(IRTYPE(3) .EQ. 1) CALL RPT03(NASP)
         IF(IRTYPE(4) .EQ. 1) CALL RPT04
         IF(IRTYPE(5) .EQ. 1) CALL RPT05(NATP)
         IF(IRTYPE(6) .EQ. 1) CALL RPT06(NASP)
         IF(IRTYPE(7) .EQ. 1) CALL RPT07
         IF(IRPT .EQ. 0) THEN
            PRINT*,' ENTER ZERO TO STOP '
      END IF
      RETURN
C
C
      SUBROUTINE RPT01(IANS)
C     REPORT TYPE ONE
C**** IUNIT REPORT
  150 FORMAT(/,' UNIT STATUS PRINT OPTIONS: ',/,
     $    '  1 - PRINT ALL',/,
     $    '  2 - SINGLE UNIT',/,
     $    '  3 - RETURN',/,
     $    '  ?')
      IF(IANS.LT.1.OR.IANS.GT.3) THEN
         WRITE(6,150)
         READ(5,*)IANS
      END IF
      GO TO (160,240,230) IANS
C**** LOOP THROUGH UNITS
  160 DO 220 I = 1,75
C**** IF NO TYPE CODE BYPASS
      IF(IUNIT(I,1) .EQ. 0)GO TO 220
C**** IF NO UNIT NAME GO TO 400
      IF(AUNIT(I,2).EQ.'    ') GO TO 220
C**** PRINT HEADER
      WRITE(14,170)
  170 FORMAT(42X,///,' UNIT STATUS',43X,'UNIT DATA',29X,'WPN DATA',//
     $,15X,'AMMO-CODE   WPN-TYP  WPN-ALIVE CUR-SUP RNDS-ONWAY PCBL-W ON-
     $TRKS  NO WPN SH / NO SH EA TOT-DMD ' )
      WRITE(14,180)AUNIT(I,2),I,IUNIT(I,1),IUNIT(I,2),IUNIT(I,4),
     $  IUNIT(I,3),IUNIT(I,5),IUNIT(I,7)
  180 FORMAT(1X,A10,2I3,/,' SER ATP ',I2,I3,' KM',/,' SER ASP ',I2,I3,'
     $KM',/, '  NO HELO ',I2)
      DO 210 J = 1,LPPAR(6)
      JJ = 13 * J - 5
      IF(IUNIT(I,JJ) .EQ. 0)GO TO 210
      NMSHT=0
      IF(IUNIT(I,JJ+2).EQ.0) GO TO 190
      NMSHT = IUNIT(I,JJ+3) / IUNIT(I,JJ+2)
  190 CONTINUE
      IPCBL=100*IUNIT(I,JJ+4)/(IUNIT(I,JJ+1)*IUNIT(I,JJ+7))
      WRITE(14,200)IUNIT(I,JJ),IWPN(IUNIT(I,JJ)),IUNIT(I,JJ+1),IUNIT(
     $I,JJ+4),IUNIT(I,JJ+12),IPCBL,IUNIT(I,JJ+8),IUNIT(I,JJ+2),NMSHT,
     $    IUNIT(I,JJ+11)
  200 FORMAT(18X,I3,6X,A8,I7,I8,5X,I5,4X,I6,2X,I5,8X,I4,' / ',I5,5X,I5)
  210 CONTINUE
C**** PRINT STATUS OF UNIT TRUCKS
      CALL TRUCK (I)
  220 CONTINUE
  230 RETURN
  240 WRITE(6,250)
  250 FORMAT(' ENTER JIFFY UNIT ID (INPUT 0 TO EXIT)  ')
      READ(5,260) NAME
      IF (NAME .EQ. '0') RETURN
  260 FORMAT(A10)
```

```
      IF(IUNIT(K,1).EQ.0) GO TO 270
      IF(AUNIT(K,2).EQ.NAME) GO TO 290
  270 CONTINUE
      WRITE(6,280) NAME
  280 FORMAT(' UNIT ',A10,' NOT FOUND')
      GO TO 240
  290 WRITE(14,300) NAME
  300 FORMAT(/,1X,'UNIT',1X,A10,4X,'UNIT DATA',22X,'WPN DATA',/,10X,
     $ 'WPN',10X,'RNDS',18X,'# WPN # RND',/,1X,'WPN-TYP',2X,
     $ 'LIVE CUR-SUP ONWAY  PCBL ON-TRKS',3X,'SHORT SH EA TOT-DMD')
      DO 320 KK=8,LPPAR(6) * 13 - 5,13
      IF(IUNIT(K,KK).EQ.0) GO TO 320
      NMSHT=IUNIT(K,KK+3)/IUNIT(K,KK+2)
      IPCBL=100*IUNIT(K,KK+4)/(IUNIT(K,KK+1)*IUNIT(K,KK+7))
      WRITE(14,310) IWPN(IUNIT(K,KK)),IUNIT(K,KK+1),IUNIT(K,KK+4),
     $ IUNIT(K,KK+3),IPCBL,IUNIT(K,KK+8),IUNIT(K,KK+2),NMSHT,
     $ IUNIT(K,KK+11)
  310 FORMAT(1X,A8,1X,I3,2X,I6,2X,I5,2X,I3,2X,I6,4X,I4,2X,I5,1X,I5)
  320 CONTINUE
C**** PRINT STATUS OF UNIT TRUCKS
      CALL TRUCK (K)
      GO TO 240
C      RETURN
C
C
C
      SUBROUTINE RPT02(NATP)
C**** REPORT TYPE TWO
C     ATP STATUS
      WRITE (6,*) ' ENTER NUMB OF ACTIVE ATPS (1,2,...OR10)'
      READ (5,*)  NATP
      IF (NATP .LT. 1 .OR. NATP .GT. 10) NATP = 10
      DO 380 I = 1,NATP
      WRITE(14,350)I,IATP(I,14),IATP(I,15)
  350 FORMAT(////,25X,' ATP STATUS ',//,3X,'ATP NO ',I3,//,
     $    10X,'QUEUE           ARTY           MU',/,10X,
     $    'TRUCKS IN Q',
     $    5X,I3,8X,I3,//,10X,'AMMO-CODE  AMT-O/H CUR-DMD ON-THE-WAY')
      DO 370 J = 1,11
      JJ = J * 3 + 18
      wRITE(14,360)J,IATP(I,JJ),IATP(I,JJ+1),IATP(I,JJ+2)
  360 FORMAT(13X,I3,4X,I8,2X,I6,5X,I6)
  370 CONTINUE
  380 CONTINUE
      write(14,382)
  382 format(////,37x,'atp queue information',//,
     z  5x,'atp num',5x,'trks served',5x,'avg time',5x,'max time',
     z  5x,'trks served',5x,'avg time',5x,'max time',/,
     z  16x,'manuver queue',5x,'in queue',5x,'in queue',
     z  5x,' arty queue ',5x,'in queue',5x,'in queue')
      do 384 j=1,natp
      write(14,383)j,jatp(j,1),jatp(j,2)/jatp(j,1),jatp(j,3),
     z  jatp(j,4),jatp(j,5)/jatp(j,4),jatp(j,6)
  383 format(7x,i2,11x,i4,11x,i4,9x,i4,9x,i4,12x,i4,9x,i4)
```

```
      RETURN
C
C
C
      SUBROUTINE RPT03(NASP)
C
C**** REPORT TYPE THREE
C**** IASP REPORT
      WRITE (6,*) ' ENTER NUMBER OF ACTIVE ASPS (1,2,...OR10)'
      READ (5,*) NASP
      IF (NASP .LE. 0 .OR. NASP .GT. 10 )NASP = 10
      DO 430 I = 1, NASP
C**** OUTPUT INFO
      WRITE(14,400)I+10,IASP(I,12),IASP(I,13)
  400 FORMAT(1X,////,25X,' ASP STATUS ',///,5X,' ASP-NO ',I3,///,
     $ 15X,'QUEUE         ROUTINE         MLRS',/,
     $ 10X,'TRUCKS IN Q',5X,I5,8X,I5,///,' INVENTORY',6x,
     $'AMMO-CODE    AMT-O/H DEMAND  ON-THE-WAY')
      DO 420 J = 1,LPPAR(1)
      JJ = J * 3 + 18
      WRITE(14,410)J,IASP(I,JJ),IASP(I,JJ+1),IASP(I,JJ+2)
  410 FORMAT(19X,I3,4X,I8,2X,I7,4X,I7)
  420 CONTINUE
  430 CONTINUE
      RETURN
C
C
C
      SUBROUTINE RPT04
C**** REPORT TYPE FOUR
C**** ICSA REPORT
      WRITE(14,450)
  450 FORMAT(1X,////,15X,' CSA-STATUS ',//,20X,' ROUNDS DRAWN FROM CSA',
     $  /21X,' AMMO ',10X,'NUMBER-DRAWN ')
      DO 470 I = 1,LPPAR(1)
      WRITE(14,460)I,ICSA(3,I)
  460 FORMAT(22X,I3,14X,I6)
  470 CONTINUE
      RETURN
C
C
C
C
      SUBROUTINE RPT05(NATP)
C**** REPORT TYPE FIVE
C**** IATPAM REPORT - AMMO ISSUED BY ATPS
C**** LOOP THROUGH ATPS
C**** WRITE HEADERS
      WRITE (14,530)
  530 FORMAT(1X,///,30X,'  AMMO ISSUED BY ATP ',20X,
     $  'trucks bumped to asp ',/,5x,  'atp no.     1    2    3    4
     $ 5    6    7    8    9   10   11   12   13   14   15   16   17
     $18   19   20',
      do 550 i = 1,NATP
      $  IATPAM(I,5),IATPAM(I,6),IATPAM(I,7),IATPAM(I,8),IA!PAM(I,9),
      $  IATPAM(I,10),IATPAM(I,11),IATPAM(I,12),IATPAM(I,13),IATPAM(I,
      $  14),iatpam(i,15),iatpam(i,16),iatpam(i,17),iatpam(i,18),
      $  iatpam(i,19),iatpam(i,20)
  540 FORMAT (7X,I2,5X,20I5)
  550 CONTINUE
      RETURN
C
C
C
      SUBROUTINE RPT06(NASP)
C**** REPORT TYPE SEVEN
      IF (NASP.LE.0.OR.NASP.GT.6) NASP = 6
C**** AMMO REMOVED FROM ASPS
C**** WRITE HEADER
      WRITE(14,570)
C     LOOP THROUGH ASPS
      DO 600 I = 1,NASP
      WRITE (14,570) I+10
  570 FORMAT (//,20X,'ASP ',I2,10X,'AMMO TYPE',10X,'AMMO REMOVED')
      DO 590 J= 1,23
      WRITE (14,580) J,IASPAM(I,J)
  580 FORMAT (40X,I2,15X,I7)
  590 CONTINUE
  600 CONTINUE
      write(14,602)
  602 format(////,37x,'asp queue information',//,
     z  5x,'asp num',5x,'trks served',5x,'avg time',5x,'max time',
     z  5x,'trks served',5x,'avg time',5x,'max time',/,
     z  16x,'routine que',5x,'in queue',5x,'in queue',
     z  5x,'ssrs queue ',5x,'in queue',5x,'in queue')
       do 606 j=1,nasp
       write(14,604)j+10,jasp(j,1),jasp(j,2)/jasp(j,1),jasp(j,3),
     z  jasp(j,4),jasp(j,5)/jasp(j,4),jasp(j,6)
  604 format(7x,i2,11x,i4,11x,i4,9x,i4,9x,i4,12x,i4,9x,i4)
  606 continue
      RETURN
C
C
C
      SUBROUTINE RPT07
C**** REPORT TYPE SEVEN
C**** TRUCKS THAT HAVE BEEN KILLED OR HAVE BROKEN
C**** LOOP THROUGH TRUCKS FOR DEAD OR BROKEN
      DO 650 I = 1,LPPAR(4)
C**** IF NOT DEAD, GO TO 630
      IF(ITRUCK(I,3) .NE. 7)GO TO 630
C**** HAVE DEAD TRUCK, PRINT NUT
      WRITE(14,620)I,AUNIT(ITRUCK(I,4),2),ITRUCK(I,1),ITRUCK(I,5)
  620 FORMAT(' TRUCK NUMB',I4,' OF UNIT ',A10,' WHICH IS TYPE 'I4,' CARR
     $YING AMMN',I4,' IS DEAD')
      GO TO 650
  630 CONTINUE
C**** IF NOT BEING REPAIRED GO TO 650
```

```
      if(itruck(i,3).ne.6 .and. itruck(i,1) .eq. 1 .AND.
     Z  ITRUCK(I,4) .NE. 0)
     z  jtrks(iunit(itruck(i,4),1)) = jtrks(iunit(itruck(i,4),1)) + 1
      IF(ITRUCK(I,3) .NE. 6)GO TO 650
C**** HAVE BROKEN TRUCK, PRINT INFO
      ISAVE=AUNIT(ITRUCK(I,4),2)
      IF(ITRUCK(I,2).NE.1) ISAVE='NON-UNIT'
      WRITE(14,640)I,ISAVE,ITRUCK(I,1),ITRUCK(I,5)
  640 FORMAT(' TRUCK NUMB',I4,' OF UNIT ',A10,' WHICH IS TYPE ',I3,
     $    'CARRYING AMMO MIX',I4,' IS BEING REPAIRED')
  650 CONTINUE
      do 655 k=1,8
      junit(k,22) = jtrks(k) * tcilng + junit(k,22)
  655 continue
      write(14,920)
  920 format(////,46x,'unit truck resupply information
     z      (right three times in hours)',//,
     z  5x,'unit',5x,'trips to',5x,'avg trip',5x,'trips to',5x,
     z  'avg trip',5x,'percent',5x,' time for ',5x,'total time',
     z  5x,'slack',5x,'percent',/,
     z  5x,'type',5x,' an atp ',5x,'  time  ',5x,' an asp ',3x,
     z  '  time  ',5x,'to asps',5x,'wpn reload',5x,'available',
     z  5x,'time ',5x,' slack')
      do 940 j=1,8
c     find the average turn around for atr and asp trips
      katpt = junit(j,4)/junit(j,1) + junit(j,16)/junit(j,13)
      kaspt = junit(j,8)/junit(j,5) + junit(j,20)/junit(j,17)
c     find the slack time
      kslack = (junit(j,22)-junit(j,21)-junit(j,20)-junit(j,16)
     z     -junit(j,12)-junit(j,8)-junit(j,4))/60
      kpasp = junit(j,17) * 100 / (junit(j,17) + junit(j,13))
      write(14,930)j,junit(j,13),katpt,junit(j,17),kaspt,
     z  kpasp,junit(j,21)/60,junit(j,22)/60,
     z  kslack,(kslack*60*100/junit(j,22))
  930 format(6x,i2,6x,i4,9x,i4,9x,i4,9x,i4,10x,i3,10x,i5,9x,i7,7x,
     z   i5,7x,i3)
  940 continue
      do 980 j=1,8
      write(14,950) j
  950 format(////,10x,'truck movement data for unit type',i2,//,
     z 5x,'type',5x,'trucks',5x,'trucks',5x,'trucks',5x,'avg travel',/,
     z 5x,'move',5x,' sent ',5x,'killed',5x,'failed',5x,'   time')
      do 970 k=1,5
      write(14,960)k,junit(j,4*k-3),junit(j,4*k-2),junit(j,4*k-1),
     z  junit(j,4*k)/junit(j,4*k-3)
  960 format(6x,i1,7x,i4,7x,i3,7x,i3,10x,i4)
  970 continue
  980 continue
      write(14,990)junit(1,23),junit(2,23),junit(3,23),junit(4,23),
     z  junit(5,23),junit(6,23),junit(7,23),junit(8,23)
  990 format(////,18x,'trucks killed during reload',//,5x,'unit  -   1',
     z  6x,'2',6x,'3',6x,'4',6x,'5',6x,'6',6x,'7',6x,'8',/,5x,
     z  'trucks -  ',i2,5x,i2,5x,i2,5x,i2,5x,i2,5x,i2,5x,i2,5x,i2)
c
```

```
C
      WRITE (18,11)
11    FORMAT(//,10X,'EMPTY S&P TRAILERS AT CSA',//,
     A9X,'S&P NO',8X,'OWNER',9X,'MIX',/)
      DO 25 III=836,1211
C*******IF NOT IN CSA DROP THROUGH
C
      IF(ITRUCK(III,3).NE.8)GO TO 25
      WRITE(18,35)III,ITRUCK(III,4),ITRUCK(III,5)
35    FORMAT(10X,I4,10X,I3,10X,I2)
25    CONTINUE
C
C**************PRINT EMPTY S&P TRAILERS AT ATFS
      WRITE(18,22)
22    FORMAT(//,10X,'EMPTY S&P TRAILERS AT ATP',//,
     A9X,'S&P NO',8X,'OWNER',9X,'MIX',/)
      DO 55 JJJ=835,1211
      IF(ITRUCK(JJJ,3).NE.2)GO TO 55
      IF(ITRUCK(JJJ,6).NE.0)GO TO 55
      WRITE(18,35)JJJ,ITRUCK(JJJ,4),ITRUCK(JJJ,5)
55    CONTINUE
      return
      end
```

pp.   SUBROUTINE SCHED

```
      SUBROUTINE SCHED (ITYPE, IPARM, TIME)
C**** INTERFACE ROUTINE TO SCHEDULE EVENT
C
C     CALLED BY ASP, ASPAR1, ASPAR2, ASPARV, ASPCK, ATP, ATPAR1, ATPAR2,
C               ATPARV, CONTRL, CREEVT, CSAARV, CSADEP, DEMAND, DEPASP,
C               DUALMX, HELARV, INIT, RDIEXO, RDJIFF, RELOAD, SFRVFR,
C               SEVENT, UNTARV, UNTDEP
C     CALLS     LOOKEV(TO PRINT EVT), PUTEVT(TO PUT EVT IN Q), CONTRL
C
C**** H. JONES    DEC 78
C
C     LOCAL VARIABLES(NO COMMON)
C        TIME  -- TIME THAT EVENT IS TO HAPPEN, NOT CURRENT TIME!
C        ITH   -- TIME                                IN WHOLE MINUTES
C        ITS   -- TIME (FRACTIONAL PART * 3600)
C        ICHECK-- 0, PUTEVT RETURNED NORMALLY.  >0, ABNORMAL.
C
      DIMENSION IPARM(5)
      IPARM(5)=ITYPE
      CALL LOOKEV (ITYPE+0, IPARM, TIME+0., 0)
      ITH = TIME
      ITS = (TIME - ITH) * 3600
      CALL PUTEVT (IPARM, ITH, ITS, ICHECK)
      IF(ICHECK .NE. 0) THEN
         WRITE(6,30) ICHECK
         CALL CONTRL(TIME)
      END IF
C
      RETURN
   30 FORMAT(' TOO MANY EVENTS -- ',I6)
      END
```

qq.

```
       SUBROUTINE SERVER
        SUBROUTINE SERVER(IPARM)
C
C****  THIS ROUTINE PROCESSES A SERVER WHEN IT BECOMES AVAILABLE.
C      IT CHECKS THE WAIT QUEUES FOR TRUCKS AND SCHEDULES A RESUPPLY
C      EVENT  -- ATP OR ASP --, IF AN APPROPRIATE TYPE IS FOUND.  IF
C      NONE IS FOUND, THE SERVER IS PUT INTO ITS WAITING QUEUE.
C
C      CALLED BY ASPAR2, UNTARV
C      CALLS     PUTQUE, SCHED, QETQUE, IQ, FINTK, OPERA
C
C**** LOREN IVERSON  NOV 81
C
C**** SCHEDULES -- ATP, LOADING OF A UNIT RESUPPLY TRUCK
C                  ASP, LOADING OF A UNIT RESUPPLY TRUCK
C                  ASPAR1, SERVER AND S&P INTO THE ASP
C                  ASPAR2, RETURN OF EMPTY S&P
C                  UNTARV, RETURN OF IDLE SERVER
C
C**** IPARM(1) = ATP - ASP NUMBER
C**** IPARM(2) = SERVER NUMBER
C**** IPARM(3) = FLAG, EQUALS 1 IF SERVER IS FROM ASP, 0 IF FROM ATP
C
C**** LOCAL VARIABLES
C      MANART -- SET TO 1 FOR MANUEVER, 2 FOR ARTY
C      NUMTK  -- THE NUMBER OF THE SUPPLY TRUCK TO BE LOADED
C      NUMQ   -- THE QUEUE NUMBER  FOR SERVER
C      IQUE   -- THE QUEUE NUMBER FOR UNIT TRUCK
C      NCKSP  -- THE CHECK TRUCK FOR LASP S&P IN QUEUE
C      DTIME  -- DELAY TIME
C      NTQUE  -- TIME SPENT IN QUEUE
C
       INCLUDE LOG,LIST
       DIMENSION IPARM(5)
C
       NUMSVR = IPARM(2)
       IAPTYP = IPARM(3)
C
C ** CHECK FOR SERVER
       IF(ITRUCK(NUMSVR,1).NE.9.AND.ITRUCK(NUMSVR,1).NE. 8)THEN
          WRITE(LUOUT,5)NUMSVR
    5     FORMAT(2X,I5,' IS NOT A SERVER')
          RETURN
       END IF
       NFLAG = 0
C**** SET SERVER STATUS AS AVAILABLE
       ITRUCK(NUMSVR,3) = 1
C
C**** DETERMINE IF THE UNIT IS AN ATP OR ASP(=1)
       IF(IAPTYP .EQ. 1) GO TO 40
C
C****     HAVE AN ATP
       NATP = IPARM(1)
C * * * IF EQ, ATP HAS BEEN INTERDICTED -- PUT SERVER IN QUE
```

```
         CALL PUTQUE(NUMSVR,ISERV(3))
         ITRUCK(NUMSVR,3) = 9
         RETURN
      END IF
C
C**** IATP(NATP,16) IS ATP SERVER REMOVAL COUNTER
      IF(IATP(NATP,16) .LT. ISERV(1) .AND. NATP .NE. IATPSD(4)) THEN
         DTIME = ISERV(7)
         IPARM(4) = DTIME
   8     CALL SCHED(8,IPARM,TIME+DTIME)         @ UNTARV
         ITRUCK(NUMSVR,3) = 5
         IATP(NATP,16) = IATP(NATP,16) + 1
         WRITE(6,9)NUMSVR,NATP,TIME
  9      FORMAT(5X,'SERVER',I5,' AT ATP',I3,' IS MOVING REARWORD',
     $      ' AT TIME',F8.1)
         IF(IATP(NATP,16) .LT. ISERV(1))THEN
            CALL GETQUE(NUMSVR,IATP(NATP,10))
            IF(NUMSVR .EQ. 0)RETURN
            IPARM(2) = NUMSVR
            GO TO 8
         END IF
         RETURN
      END IF
      IF(ITRUCK(NUMSVR,1) .EQ. 9) GO TO 20
C
C****       HAVE A FORKLIFT
      IQUE = IATP(NATP,12)
      CALL GETQUE(NUMTK,IQUE)
      IF(NUMTK .NE. 0) THEN
C****    HAVE A MANUEVER TRUCK SET UP FOR ATP EVENT
         MANART = 2
      ELSE
         IQUE = IATP(NATP,11)
         CALL GETQUE(NUMTK,IQUE)
         IF(NUMTK .NE. 0) THEN
            NCKTK = NUMTK
12          IF((ITRUCK(NUMTK,5).EQ.10).OR.(ITRUCK(NUMTK,5).EQ.40))THEN
               CALL PUTQUE(NUMTK,IQUE)
               CALL GETQUE(NUMTK,IQUE)
               IF(NUMTK .EQ. NCKTK)THEN
                  CALL PUTQUE(NUMTK,IQUE)
                  GO TO 10
               ELSE
                  GO TO 12
               END IF
            END IF
C****        HAVE AN ARTY TRUCK SET UP ATP EVENT
           MANART = 1
         ELSE
C
C****       PUT THE SERVER IN THE QUEUE
10           NUMQ = IATP(NATP,10)
           CALL PUTQUE(NUMSVR,NUMQ)
           RETURN
      END IF
      NFLAG = 1
      GO TO 50
C
C****      HAVE A CRANE
20    IQUE = IATP(NATP,11)
      CALL GETQUE( NUMTK,IQUE)
      IF( NUMTK .NE. 0) THEN
         NCKTK = NUMTK
22       IF((ITRUCK(NUMTK,5).EQ.10).OR.(ITRUCK(NUMTK,5).EQ.40))THEN
            CALL PUTQUE(NUMTK,IQUE)
            CALL GETQUE(NUMTK,IQUE)
            IF(NUMTK .EQ. NCKTK)THEN
               CALL PUTQUE(NUMTK,IQUE)
               GO TO 25
            ELSE
               GO TO 22
            END IF
         END IF
C****     HAVE A ARTY TRUCK SET ATP EVENT
         MANART = 1
      ELSE
C****  PUT THE SERVER IN THE QUEUE
  25     NUMQ = IATP(NATP,10)
         CALL PUTQUE(NUMSVR, NUMQ)
         RETURN
      END IF
C
  50  MIX = ITRUCK(NUMTK,5)
      JLOOP = LPPAR(1)
      DO 55 I = 1,LPPAR(1)
         IF(IMIX(MIX,I) .EQ. 0)GO TO 55
         IAM = I
         GO TO 60
   55 CONTINUE
C
C**** CHECK IF AN S&P IS AVAILABLE FOR RELOADING
   60 NATPQ = IQ(2,NATP)
   70 CALL FINTK(NATPQ,IAM,NATPTK,0)
      IF(NATPTK .NE. 0)GO TO 80
      IF(NATPQ .NE. IQ(3,NATP))THEN
         NATPQ = IQ(3,NATP)
         GO TO 70
      ELSE
         CALL PUTQUE(NUMTK,IQUE)
         IF(NFLAG .EQ. 1)THEN
            GO TO 10
         ELSE
            GO TO 25
         END IF
      END IF
C
C**** HAVE FOUND A TRUCK, PUT BACK IN QUEUE
   80 CALL PUTQUE(NATPTK,NATPQ)
```

```
C****     SCHEDULE THE ATP EVENT
          IPARM(4) = NUMSVR
          IPARM(3) = NUMTK
          IPARM(2) = NATP
          IPARM(1) = MANART
          CALL SCHED(6,IPARM,TIME)             @ ATP
          ITRUCK(NUMSVR,3) = 4
          RETURN
C
C**** HAVE AN ASP, LOOK FOR A TRUCK
   40 NASP = IPARM(1) - 10
C * * * IF EQ, ASP HAS BEEN INTERDICTED -- PUT SERVER IN QUE
      IF((NASP + 10) .EQ. ISERV(6))THEN
         CALL PUTQUE(NUMSVR,ISERV(4))
         ITRUCK(NUMSVR,3) = 9
         RETURN
      END IF
C**** IASP(NASP,16) IS ASP SERVER REMOVAL COUNTER
      IF (IASP(NASP,16) .LT. ISERV(2)  .AND. IASP(NASP,2) .EQ. 0) THEN
         NRASP = IASP(NASP,11) - 10
         DIST = IASP(NASP,1) - IASP(NRASP,1)
         TRTM = 60. * DIST / ITYPE(5,IDAY+3) + 30.   @ 30 MIN LOAD/UNL
         IFARM(4) = TRTM
  45     ITRUCK(NUMSVR,3) = 5
         ITRUCK(NUMSVR,4) = NRASP + 155
         IASP(NASP,16) = IASP(NASP,16) + 1
         CALL SCHED(8,IPARM,TIME+TRTM)     @ SEND TO REAR ASP(UNTARV)
         WRITE(6,48)NUMSVR,NASP,NRASP+10,TIME
  48     FORMAT(5X,'SERVER',I5,' AT ASP',I3,' MOVED TO ASP',I3,
     $      ' AT TIME',F8.1)
         IF(IASP(NASP,16) .LT. ISERV(2))THEN
            CALL GETQUE(NUMSVR,IASP(NASP,7))
            IF(NUMSVR .EQ. 0)RETURN
            IPARM(2) = NUMSVR
            GO TO 45
         END IF
         RETURN
      END IF
C * * PREPARATION OF HELICOPTER SLING LOAD
      IF(IASP(NASP,15) .GT. 0)THEN
         IASP(NASP,15) = IASP(NASP,38) - 1
         IPARM(4) = 47
         CALL SCHED(8,IPARM,TIME + 45.)        @ UNTARV
         ITRUCK(NUMSVR,3) = 4
         RETURN
      END IF
C**** LOCATE UNIT TRUCK TO BE LOADED
      NUMQ = IASP(NASP,9)
      CALL GETQUE(NUMTK,NUMQ)
      IF(NUMTK .GT. 0) THEN
         NCKTK = NUMTK
         CALL PUTQUE(NUMTK,NUMQ)
  400    CALL GETQUE(NUMTK,NUMQ)
         MIX = ITRUCK(NUMTK,5)
         NUMAM = MIX
         IF (MIX .GT. LPPAR(7)) NUMAM = MIX - LPPAR(7)
C * * * DETERMINE IF SUFFICIENT AMMO AT PARENT ASP
         IF(IASP(NASP,NUMAM*3+13) - IASP(NASP,NUMAM*3 + 19) .GE.
     $      IMIX(MIX,NUMAM)) THEN
C****       HAVE A TRUCK, SCHEDULE ASP EVENT
            IPARM(1) = 1
            IPARM(2) = NASP + 10
            IPARM(3) = NUMTK
            IPARM(4) = NUMSVR
            CALL SCHED(7,IPARM,TIME)              @ ASP
            ITRUCK(NUMSVR,3) = 4
            RETURN
         ELSE
            CALL PUTQUE(NUMTK,NUMQ)
            IF(NCKTK .EQ. NUMTK) GO TO 600
            GO TO 400
         END IF
      ELSE
C
C************************************************************************
C
C
C * * * CHECK FOR ASP-ATP S&P TO LOAD
  600 CALL GETQUE(NATPSP,IQ(11,NASP))
      IF(NATPSP .EQ. 0)GO TO 700
C * * * SERVER AVAILABLE  PUT IN QUEUQ AND SCHED ASPAR1
      CALL PUTQUE(NUMSVR,IQ(10,NASP))
      NATP = ITRUCK(NATPSP,4) - 85
      IPARM(1) = NATP
      IPARM(2) = NATPSP
      IPARM(3) = NASP + 10
      IPARM(4) = 0
      CALL SCHED(12,IPARM,TIME)                @ ASPAR1
C     FIND THE QUEUE WAIT TIME AND ADD IT TO TOTAL QUEUE TIME
      NTQUE = TIME - ITRUCK(NATPSP,3)
      ITRUCK(NATPSP,12) = ITRUCK(NATPSP,12) + NTQUE
      JASP(NASP,8) = JASP(NASP,8) + NTQUE
C     IF THIS IS THE LONGEST QUEUE WAIT RECORD IT
      IF(NTQUE.GT.JASP(NASP,9)) JASP(NASP,9) = NTQUE
      RETURN
C
C**********************************************************************
C******LOOK FOR S & P TO OFF LOAD
  700 NUMQ = IASP(NASP,4)
      CALL GETQUE(NUMSP,NUMQ)
      IF(NUMSP.NE.0)GO TO 300
C
C********** NO TRAILERS IN QUE,PUT SERVER BACK IN HIS QUE
      NUMQ = IASP(NASP,7)
      CALL PUTQUE(NUMSVR,NUMQ)
      RETURN
      END IF
C
```

```
 800  IF(ITRUCK(NUMSP,6).EQ.0)THEN
         NCKSP = NUMSP
 850      CALL PUTQUE(NUMSP,NUMQ)
         CALL GETQUE(NUMSP,NUMQ)
         IF(ITRUCK(NUMSP,6).NE.0)GO TO 900
         IF(NUMSP.EQ.NCKSP)THEN
            CALL PUTQUE(NUMSP,NUMQ)
            NUMQ = IASP(NASP,7)
            CALL PUTQUE(NUMSVR,NUMQ)
            RETURN
         END IF
         GO TO 850
      ELSE
900      WRITE(18,950)NUMSVR,NUMSP,ITRUCK(NUMSP,5),ITRUCK(NUMSP,6),TIME
950       FORMAT(/,10X,'SERVER NO.',I5,' IS OFFLOADING',I5,
     1   ' MIX ',I2, '  %  ',I5,' AT TIME ',F8.1)
         MIX = ITRUCK(NUMSP,5)
         ITRUCK(NUMSVR,3) = 4
C
C********************    CHECK FOR FAILURE & SCHEDULE AVAIL. OF SERVER
         TLOAD = IMIX(MIX,32)* (ITRUCK(NUMSP,6)/10000.)
         CALL OPERA(NUMSVR,TLOAD,TFAIL)
         DTIME = TIME + TLOAD + TFAIL
         CALL SCHED(8,IPARM,DTIME)              @ UNTARV
         ITRUCK(NUMSVR,5) = ITRUCK(NUMSVR,5) + TLOAD
C                                    TOT TIME OFF-LOADING S&PS AT ASP
         ITRUCK(NUMSVR,9) = ITRUCK(NUMSVR,9) + 1 @SERVER OFF-LOAD CNTER
C
C*************** DECREMENT AMMO ON TRAILER
         ITRUCK(NUMSP,6) = 0
         IPARM(2) = NUMSP
         IPARM(3) = 0
         IPARM(4) = 555
         IF(TFAIL .GT. 0.)DTIME = DTIME - TFAIL
         CALL SCHED(13,IPARM,DTIME)             @ ASPAR2
      END IF
C
      RETURN
      END
```

```
rr.     SUBROUTINE SEVENT
      SUBROUTINE SEVENT
C
C**************************************************
C
C     THIS ROUTINE ADDS THE EVENTS CREATED SEPARTELY
C     AND STORED ON FILE TO BE SCHEDULED IN RUNS OF ARM
C     (INPUT THRU EVENTSCI--).
C
C
C     ADDED 1 MAY 82                  ANN HILLS
C**************************************************
C
C     VARIABLES USED:
C     ITYP...THE TYPE OF EVENT
C     IIPARMS...THE PARAMETERS OF THE EVENT
C     SSTIME...THE TIME THE EVENT IS TO BE SCHEDULED
C
C**************************************************
C     FILES USED:
C        FILE 11 WHICH CONTAINS THE EVENTS
C     ROUTINES CALLED:
C        SCHED TO SCHEDULE THE EVENTS
C     CALLED BY INIT
C************************************************
C
      DIMENSION ITYPE(500),IPARM1(500),IPARM2(500),IPARM3(500)
      DIMENSION IPARM4(500),IPARM5(500),STIME(500),IIPARM(5)
C
C     ZERO OUT THE ARRAYS
      DO 100 I=1,500
         ITYPE(I)=0
         IPARM1(I)=0
         IPARM2(I)=0
         IPARM3(I)=0
         IPARM4(I)=0
         IPARM5(I)=0
         STIME(I)=0.
100   CONTINUE
      DO 101 I=1,5
         IIPARM(I)=0
101   CONTINUE
C
C
C     NOW READ THE EVENTS FROM FILE 11 INTO TEMPORARY ARRAYS
C
      READ(11) ITYPE,IPARM1,IPARM2,IPARM3,IPARM4,IPARM5,STIME
C
C     LOOP TO SET ARRAY VALUES EQUAL TO NECESSARY PARAMETERS
C     NEEDED TO SCHEDULE EVENTS....IF AT THE END OF THE
C     EVENTS GET OUT OF THE LOOP
C
      DO 500 I=1,500
      ITYP=ITYPE(I)
      IF(ITYP.LT.0.OR.ITYP.GT.19)THEN
         PRINT*,'THE FOLLOWING EVENT IS INCORRECT'
         PRINT 12,ITYP,IPARM1(I),IPARM2(I),IPARM3(I),IPARM4(I),IPARM5(I)
12       FORMAT(T2,'EVT # ',I3,'WITH PARMS ',5I8)
         PRINT*, 'THIS EVENT IS NOT SCHEDULED'
         GO TO 500
      END IF
      IIPARM(1)=IPARM1(I)
      IIPARM(2)=IPARM2(I)
      IIPARM(3)=IPARM3(I)
      IIPARM(4)=IPARM4(I)
      IIPARM(5)=IPARM5(I)
      SSTIME=STIME(I)
      CALL SCHED(ITYP,IIPARM,SSTIME)
500   CONTINUE
C
      RETURN
      END
```

SS. SUBROUTINE SETQUE

```
      SUBROUTINE SETQUE (ITEM, NUMQUE)
C**** SETS UP NUMQUE EMPTY QUEUES FOR ITEM.
C         EX.   CALL SETQUE(176,1400) CLEARS ALL QUEUES.
C
C     CALLED BY TRKPUT
C
C**** H. JONES    DEC 78
      INCLUDE QUENUM,LIST
      INCLUDE QUEPNT,LIST
      DO 10 I=1,NUMQUE
   10 IHEAD(I) = 0
C
      DO 20 I=1,ITEM
   20 ITEMS(I) = 0
C
      RETURN
      END
```

tt.   SUBROUTINE TRKPUT

```
      SUBROUTINE TRKPUT
C**** ALLOWS INTERACTIVE TRUCK QUEUE RE-ASSIGNMENT
C
C     CALLED BY CONTRL (OR EDIT IN THE EDIT PROGRAM)
C     CALLS     READF, NXTQUE, PUTQUE, GETQUE, SETQUE, GETONE
C
C**** H. JONES    FEB 79
C
      CHARACTER*20 IWORD
      DIMENSION INTGR(10), REAL(10), IWORD(10)
C
    5 WRITE(6,10)
   10 FORMAT(1X,'COMMAND EXAMPLES :',/,
     $  1X,'GET 3 FROM 35 ',/,
     $  1X,'PUT 3, 10 IN 105 ',/,
     $  1X,'LIST 105 ',/,
     $  1X,'TAKE  OUT ',/,
     $  1X,'END ',/)
C
   20 WRITE(6,30)
   30 FORMAT(' ...')
       CALL READF (5, 10, INTGR, REAL, IWORD)
      IF(IWORD(1) .EQ. 'GET' .OR. IWORD(1) .EQ. 'G') GO TO 40
      IF(IWORD(1) .EQ. 'PUT' .OR. IWORD(1) .EQ. 'P') GO TO 60
      IF(IWORD(1) .EQ. 'LIST' .OR. IWORD(1) .EQ. 'L') GO TO 80
      IF(IWORD(1) .EQ. 'TAKE' .OR. IWORD(1) .EQ. 'T') GO TO 110
      IF(IWORD(1) .EQ. 'END' .OR. IWORD(1) .EQ. 'E') GO TO 120
      IF(IWORD(1) .EQ. 'HELP' .OR. IWORD(1) .EQ. 'H') GO TO 5
      PRINT*,' WHAT???'
      GO TO 20
C
C**** GET TRUCK FROM QUEUE WITHOUT RE-ORDERING QUEUE
   40 I1 = INTGR(1)
      I2 = INTGR(2)
      IF(INTGR(3) .NE. 0) THEN
         PRINT*,' INPUT ERROR'
         GO TO 20
      END IF
      CALL GETONE(I2, I1, IFLAG)
      IF(IFLAG .NE. 0)PRINT*,I1,' NOT GOT'
      GO TO 20
C
C**** PUT TRUCK IN QUEUE
  60  IF(INTGR(1) .LE. 0 .OR. INTGR(2).LE.0 .OR. INTGR(1).GT.1440) THEN
         PRINT*,'RE-ENTER '
         GO TO 20
      END IF
      I1 = INTGR(1)
      I2 = INTGR(2)
      I3 = INTGR(3)
      IF(INTGR(3) .EQ. 0) THEN
         I3 = INTGR(2)
         I2 = INTGR(1)
      DO 70 I=I1,I2
   70 CALL PUTQUE (I, I3)
      GO TO 20
C
C**** LIST TRUCKS IN QUEUE
   80 CALL NXTQUE (IFIRST, INTGR(1))
      IF(IFIRST .EQ. 0) GO TO 20
   90 CALL GETQUE(NUMTK, INTGR(1))
      CALL PUTQUE(NUMTK, INTGR(1))
      WRITE(6,100) NUMTK
  100 FORMAT(1X,I5)
      CALL NXTQUE (INEXT, INTGR(1))
      IF(INEXT .NE. IFIRST) GO TO 90
      GO TO 20
C
C**** TAKE  TRUCKS OUT OF QUEUES
  110 PRINT*,' ENTER QUEUE NUMBER (999 TO TAKE OUT FROM ALL QUEUES)'
      READ(5,*)IQNUM
      IF(IQNUM .NE. 999)THEN
  200    CALL GETQUE(NUMTK,IQNUM)
         IF(NUMTK .EQ. 0)GO TO 20
         GO TO 200
      ELSE
         CALL SETQUE(1400,176)
      END IF
      GO TO 20
C
  120 RETURN
      END
```

```
uu.     SUBROUTINE TRKTIM
         SUBROUTINE TRKTIM
   C     INITIALIZES TRUCKS' TIME TO NEXT FAIL(EXPONENTIAL DISTRIBUTION).
   C
   C     CALLED BY INIT
   C     CALLS     NOTHING
   C
         INCLUDE LOG,LIST
         CHARACTER*3 IANS
   C
         WRITE(6,10)
      10 FORMAT(' INITIALIZE TRUCKS'' TIME SINCE LAST FAILURE? (YES/NO)')
         READ(5,20)IANS
      20 FORMAT(A3)
   C
         IF(IANS .EQ. 'NO ' .OR. IANS .EQ. 'N  ') GO TO 40
   C
   C**** LOOP THROUGH TRUCKS
         DO 30 I = 1,LPPAR(4)                   @ MAX # OF TRUCKS
            ITYP = ITRUCK(I,1)
   C           IF NOT ACTIVE BYPASS
            IF (ITYP .EQ. 0) GO TO 30
   C           FIND MTBF
            XMTBF = ITYPE(ITYP,5)
   C           COMPUTE TIME TO NEXT FAILURE(EXPONENTIAL DISTRIBUTION)
            UNRN = RANF(DUM)
            XRAN = (-XMTBF*ALOG(1-UNRN))
   C           STORE TIME SINCE MAINT. FOR THIS TRUCK
            ITRUCK(I,7) = XRAN
      30 CONTINUE
   C
      40 RETURN
         END
```

VV. SUBROUTINE TRUCK

```
      SUBROUTINE TRUCK  (L)
C**** WRITES STATUS OF UNIT TRUCKS
C
C     CALLED BY REPORT
C     CALLS     NOTHING
C
C**** D REMEN JUN 79
C
      CHARACTER*10 AUNIT
      INCLUDE LOG,LIST
      INCLUDE AUNIT,LIST
C**** WRITE HEADER
      WRITE(14,10)AUNIT(L,2)
   10 FORMAT(1X,///,8X,' TRUCK STATUS REPORT FOR UNIT ',A10,///,
     $    '     TRK      NM   STATUS   MIX  PCLOAD  NXFAIL',/)
C
C**** LOOP THROUGH THE TRUCKS
      DO 30 J = 1,LPPAR(4)        @ MAX # TRUCKS
C           IF TRUCK NOT OF THIS UNIT, BYPASS
         IF(ITRUCK(J,4) .NE. L)GO TO 30
         IF(ITRUCK(J,2) .NE. 1 .AND. ITRUCK(J,2) .NE. 9)GO TO 30
C           HAVE TRUCK OF THIS UNIT PRINT INFO
         WRITE(14,20) J, ITRUCK(J,2), ITRUCK(J,3), ITRUCK(J,5),
     $         ITRUCK(J,6), ITRUCK(J,7)
   20    FORMAT (2X,6I7)
   30 CONTINUE
C
      RETURN
      END
```

WW. SUBROUTINE UNTARV

```
      SUBROUTINE UNTARV (IPARM)
C**** EVENT UNTARV  --  ARRIVAL OF TRUCK AT UNIT.
C                       (ALSO MLRS(LEAVING ASP/ATP), AND SERVERS)
C                       FOR UNIT TRUCKS, PUT IN QUEUE (MAY GENERATE
C                       A RELOAD).  FOR SERVERS, CALL SERVER TO
C                       TO PUT THEM IN AVAILABLE QUEUE.
C
C     EVENT TYPE 8
C     CALLED BY MAINARM
C     CALLS     DEPASP, SERVER, IQ, PUTQUE, SCHED
C
C**** J. FOX     JAN 79
C
C**** IPARM(1) -- UNIT NUMBER
C**** IPARM(2) -- TRUCK NUMBER (0 OR -1 FOR MLRS)
C**** IPARM(4) -- 666 FOR UNIT TRUCK FAILED ON RELOAD
C
C**** SCHEDULES     --  RELOAD IF DEMAND EXISTS.
C**** SCHEDULED BY  --  ASP, ASPAR1, ATP, DUALMX, RELOAD, SERVER
C
C**** CHANGES       --  UNIT AMMO ON TRUCKS
C                   --  UNIT TRUCK QUEUE
C
      INCLUDE LOG,LIST
      DIMENSION IPARM(5)
C
C**** LOCAL VARIABLES :
C**** MIX   -- INDEX OF AMMO MIX
C**** IND   -- INDEX FOR IUNIT AMMO TYPE
C**** NUMAM -- AMMO TYPE FOR UNIT AMMO TYPE I
C**** NUMR  -- NUMBER OF ROUNDS OF TYPE NUMAM ON THE TRUCK
C**** IRESFL-- RESUPPLY FLAG  (0 = NO RESUP,  1 = SCHED RESUP)
C**** NUMQ  -- UNIT TRUCK QUEUE NUMBER
C**** ISTAT -- 0 IF UNIT TRUCK FAILED ON RELOAD
C
      NUNIT = IPARM(1)
      NUMTK = IPARM(2)
C
C**** IF THIS IS A MLRS TRUCK LEAVING THE ASP OR ATP CALL DEPASP
      IF(NUMTK .EQ. 0 .OR. NUMTK .EQ. -1) THEN
         CALL DEPASP(IPARM)
         RETURN
      END IF
C
C**** CHECK IF THE TRUCK IS A SERVER
      IF(ITRUCK(NUMTK,1) .EQ. 8 .OR. ITRUCK(NUMTK,1) .EQ. 9) THEN
        CALL SERVER(IPARM)
        RETURN
      END IF
C
C**** INITIALIZE RELOAD FLAG
      IRESFL = 0
      ISTAT = 4
```

```
C**** DETERMINE AMMO MIX
      MIX = ITRUCK(NUMTK, 5)
      IF(MIX .LE. 0) THEN
         WRITE(6,10) NUMTK
   10    FORMAT(1X,'UNTARV -- ZERO MIX ON TRUCK ',I3)
         RETURN
      END IF
C
C**** PUT TRUCK IN UNIT QUEUE
      NUMQ = IQ(1, NUNIT)
      CALL PUTQUE(NUMTK, NUMQ)
C
      IF(ITRUCK(NUMTK,3) .LE. 1 .OR. IPARM(4) .EQ. 666)ISTAT = 0
      ITRUCK(NUMTK, 3) = 1
C
C**** ADD AMMO TO UNIT AVAILABLE AMMO AND CHECK FOR GENERATING RELOAD
      DO 40 I = 1,LPPAR(6)
      IND = I*13 - 5
      NUMAM = IUNIT(NUNIT, IND)
      IF(NUMAM.EQ.0) GO TO 40
C
C**** IF NO AMMO OF THIS TYPE ON TRUCK GO TO 40
      NUMR = (IMIX(MIX,NUMAM) * ITRUCK(NUMTK,6) + 9999) / 10000
      IF(NUMR .LE. 0) GO TO 40
C
C**** HAVE THIS TYPE OF AMMO, ADD TO UNIT
      IF(ISTAT .NE. 4)GO TO 25
      IUNIT(NUNIT,IND+8) = IUNIT(NUNIT,IND+8) + NUMR
      IF(ISTAT.EQ.4)IUNIT(NUNIT,IND+12)=(IUNIT(NUNIT,IND+12))-NUMR
      ITRUCK(NUMTK,10) = ITRUCK(NUMTK,10) + 1 @ # OF ARVLS FROM ATP-ASP
C
C**** IF NOT A FARP GO TO 30
  25  IF(IUNIT(NUNIT,1).NE.8) GO TO 30
      IF(IUNIT(NUNIT,IND+4).GT.IUNIT(NUNIT,IND+1)*IUNIT(NUNIT,I
     $ND+7)+IUNIT(NUNIT,IND+1)*IUNIT(NUNIT,IND+6)) GO TO 40
C**** SET RELOAD FLAG
      IRESFL=1
      GO TO 40
C**** IF RELOAD IS NOT REQUIRED GO TO 40; ELSE SET RELOAD FLAG=IRESFL
   30 IF(IUNIT(NUNIT,IND+7) * IUNIT(NUNIT,IND+1) .LE.
     $  IUNIT(NUNIT,IND+4))GO TO 40
C
C**** SCHEDULE RELOAD FLAG
      IRESFL = 1
   40 CONTINUE
      IPARM(4) = 0
      IF(IRESFL .EQ. 1) CALL SCHED(2, IPARM, TIME)             @ RELOAD
C
      RETURN
      END
```

```
.XX.     SUBROUTINE UNTDEP
          SUBROUTINE UNTDEP (IPARM)
    C**** EVENT UNTDEP --  DEPARTURE OF TRUCK FROM UNIT.
    C                      (HAVING BEEN EMPTIED IN A RELOAD) MAY
    C                      CHANGE MIX ON THE WAY TO ATP/ASP
    C
    C     EVENT TYPE 3
    C     CALLED BY MAINARM
    C     CALLS     OPERA, INTRDK, SCHED
    C
    C**** J. FOX     JAN 79
    C
    C**** IPARM(1) -- UNIT NUMBER
    C**** IPARM(2) -- TRUCK NUMBER
    C
    C**** SCHEDULES    --  ATPARV, ARRIVAL OF TRUCK AT ATP  OR
    C                  --  ASPARV, ARRIVAL OF TRUCK AT ASP
    C
    C**** SCHEDULED BY --  DUALMX, RELOAD
    C
    C**** CHECKS       --  DELAY IN ARRIVAL TIME AT ATP OR ASP DUE
    C                      TO MTBF AND INTERDICTION.
    C
    C**** CHANGES      --  UNIT TRUCK QUEUE
    C     IPARM(4) NOW SET TO AMMO MIX ON TRUCK FOR ASP ARRIVALS
    C
          INCLUDE LOG,LIST
          DIMENSION IPARM(5)
    C
    C**** LOCAL VARIABLES
    C**** MIX    -- THE AMMO MIX INDEX
    C**** DIST   -- DISTANCE TO ATP OR ASP
    C**** ITKTYP -- TRUCK TYPE
    C**** TVLTIM -- ROAD TRAVEL TIME
    C**** IASPFG -- LOCAL FLAG  = 1 IF GOING TO ASP
    C                           = 2 IF GOING TO ATP
    C**** TOTIM  -- TIME OF ARRIVAL AT ATP OR ASP
    C**** RNEED  -- REAL NEED PER AMMO TYPE
    C**** PERSV  -- USED(WITH RNEED) TO FIND WORST NEEDED TYPE
    C**** JTYP   -- UNIT TYPE
    C
          NUNIT = IPARM(1)
          NUMTK = IPARM(2)
    C
    C     FIND THE UNIT TYPE
          JTYP = IUNIT(NUNIT,1)

    C**** DETERMINE AMMO MIX INDEX
          MIX = ITRUCK(NUMTK, 5)
          IF(MIX .EQ. 10 .OR. MIX .EQ. 40)THEN
             NUMAM = 10
             GO TO 28
          END IF
    C
```

```
      DO 5 I = 1,LPPAR(1)
      IF(IMIX(MIX,I) .GT. 0)THEN
         NUMAM = I
         GO TO 6
      END IF
    5 CONTINUE
    6 PERSV = 10000.0
      DO 10 KK=1,LPPAR(6)
C        THIS LOOP FIGURES NEED FOR ALL AMMO TYPES
C        SEND TRK AFTER TYPE NEEDED WORST
      K = 13 * KK - 5
C    FIND SMALLEST PERCENT OF AMMO AVAILABLE AND STORE IT
      IF(IUNIT(NUNIT,K) .EQ. 0)GO TO 10
      A = IUNIT(NUNIT,K+4)                     @ CURR SUPP
      B = IUNIT(NUNIT,K+1)                     @ WPNS ALV
      C = IUNIT(NUNIT,K+7)                     @ BAL
      D = IUNIT(NUNIT,K+8)                     @ ON TRKS
      E = IUNIT(NUNIT,K+12)                    @ ON THE WAY
      IF(B .EQ. 0 .OR. C .EQ. 0)GO TO 10
C * * TO COMPENSATE FOR TWO SYSTEMS USING TOW:
      Z = 1
      IF(IUNIT(NUNIT,K) .EQ. 2)Z = 0.5
      RNEED = (A + Z*D + Z*E)/(B * C)
      IF(RNEED .LT. PERSV)THEN
         PERSV = RNEED
         NUMAM = IUNIT(NUNIT,K)
      END IF
  10  CONTINUE
      IF(ITRUCK(NUMTK,1) .EQ. 1)THEN
         JLOW = 1
         JHIGH = 30
      ELSE
         JLOW = 31
         JHIGH = 60
      END IF
      DO 15 I = JLOW,JHIGH
         IF(IMIX(I,NUMAM) .GT. 0)THEN
            MIX = I
            GO TO 20
         END IF
   15 CONTINUE
   20 ITRUCK(NUMTK,5) = MIX                    @ GET WORST NEEDED TYPE
C ***** ADD THE ROUNDS DUE IN TO THE UNIT
  28  DO 25 I = 1,LPPAR(6)
      K = I * 13 - 5
      IF(IUNIT(NUNIT,K) .EQ. 0)GO TO 25
      IUNIT(NUNIT,K+12) = IUNIT(NUNIT,K+12) + IMIX(MIX,IUNIT(NUNIT,K))
   25 CONTINUE
C**** IF MIX CONTAINS AMMO OTHER THAN THAT AT ATP (1-10) GO TO ASP
      IF(NUMAM .GT. 10 .OR. IUNIT(NUNIT,2) .EQ. 0)GO TO 35
C
C**** TRUCK BOUND FOR ATP.  LOOK UP DISTANCE TO ATP  (DIST)
      DIST = IUNIT(NUNIT, 4)
      IASPFG = 2
```

```
C
C**** TRUCK BOUND FOR ASP.  LOOK UP DISTANCE TO ASP  (DIST)
   35 DIST = IUNIT (NUNIT, 5)
      IASPFG = 1
C
C**** DETERMINE TRUCK TYPE (ITKTYP)
   40 ITKTYP = ITRUCK(NUMTK, 1)
C
C**** DETERMINE ROAD TRAVEL TIME
      TVLTIM = 60. * DIST / ITYPE(ITKTYP,IDAY+1)
C**** UPDATE TRUCK STATUS CODE
      ITRUCK(NUMTK,3) = 4
C
C**** COMPUTE DELAY DUE TO INTERDICTION (TMIND)
      CALL INTRDK (NUMTK, TMIND)
      IF(TMIND .GT.0) THEN
         IF(IASPFG .EQ. 1)JUNIT(JTYP,6)=JUNIT(JTYP,6)+1
         IF(IASPFG .EQ. 2)JUNIT(JTYP,2)=JUNIT(JTYP,2)+1
         ITRUCK(NUMTK,6) = 0
         IPARM(3) = IUNIT(NUNIT,3)
         IPARM(4) = MIX
         CALL SCHED(5,IPARM,TIME+TMIND)
         RETURN
      END IF
C
C**** COMPUTE DELAY DUE TO FAILURE (TFAIL)
      CALL OPERA (NUMTK, TVLTIM, TFAIL)
C**** COMPUTE TIME OF ARRIVAL
      TOTIM = TIME + TMIND + TFAIL + TVLTIM
      IF(IASPFG .EQ. 2)GO TO 49
C
C**** SCHEDULE ASP ARRIVAL.
      IPARM(3) = IUNIT(NUNIT,3)
      IPARM(4) = MIX
C     ADD ONE TO THE NUMBER OF TRUCKS TRAVELING TO THE ASP
      JUNIT(JTYP,5) = JUNIT(JTYP,5) + 1
C   . ADD TO TRUCKS KILLED OR FAILED
      IF(TFAIL .GT. 0) JUNIT(JTYP,7) = JUNIT(JTYP,7) + 1
C     ADD THE TRAVEL TIME TO THE ACCUMULATIVE TRAVEL TIME
      JUNIT(JTYP,8) = JUNIT(JTYP,8) + TVLTIM
      CALL SCHED (5, IPARM, TOTIM)              @ ASPARV
      GO TO 50
C
C**** SCHEDULE ATP ARRIVAL.
   49 IPARM(3) = IUNIT(NUNIT,2)
      IPARM(4) = MIX
C     ADD ONE TO THE NUMBER OF TRUCKS TRAVELING TO THE ATP
      JUNIT(JTYP,1) = JUNIT(JTYP,1) + 1
      IF(TFAIL .GT. 0) JUNIT(JTYP,3) = JUNIT(JTYP,3) + 1
      JUNIT(JTYP,4) = JUNIT(JTYP,4) + TVLTIM
      CALL SCHED (4, IPARM, TOTIM)              @ ATPARV
C
   50 RETURN
      END
```

yy. SUBROUTINE GETONE

```
      SUBROUTINE GETONE(NQ, NUMTK, IFLAG)
C
C     GETONE GETS A GIVEN TRUCK 'NUMTK' OUT OF QUEUE NQ.
C     IF IT IS NOT IN THAT QUEUE, IFLAG WILL RETURN NON-ZERO.
C
C     CALLED BY TRKPRT(IN THE EDIT PROGRAM).
C
C     R. CUNNINGHAM                               MAY 83
C
      INCLUDE QUEPNT,LIST
      INCLUDE QUENUM,LIST
      NEXT = IHEAD(NQ)
      IFLAG = 1
      IF(NEXT .EQ. 0) RETURN
      IF(NEXT .EQ. NUMTK)THEN
         IHEAD(NQ) = ITEMS(NEXT)
         ITEMS(NEXT) = 0
         IFLAG = 0
         RETURN
      END IF
C
C
C
  100 CONTINUE
C
      IF(NEXT .NE. NUMTK) THEN
         LAST = NEXT
         NEXT = ITEMS(LAST)
         IF(NEXT .EQ. 0) RETURN                   @ NOT IN QUE
         GO TO 100
      ELSE
C                                                 FOUND!!
         ITEMS(LAST) = ITEMS(NEXT)
         ITEMS(NEXT) = 0
         IFLAG = 0
      END IF
      RETURN
      END
```

2. Edit Program

```
C        PROGRAM EDIT
C       (MAIN PROGRAM FOR EDITING BETWEEN CIs)
C
C       CALLS EDITD, GETQUE, PRINT, PUTQUE, TRKPUT
        CHARACTER*10 AUNIT
        INCLUDE LOG,LIST
        INCLUDE QUENUM,LIST
        INCLUDE QUEPNT,LIST
        INCLUDE AUNIT,LIST
        DIMENSION IVAL(4)
        CHARACTER*3 IANS
        DEFINE FILE 13(75,4,U,ITZ)
C
        READ(3) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,
       $ INTER,IRSTME,IATPSD,IDAY,TIME,IATPAM,ICSA,
       $ LPPAR,IASPAM,LUOUT,TCIST,TCILNG,LOOK,IHEAD,ITEMS,
       $ AUNIT,JUNIT,JATP,JASP,IATPSP,IASPSP,IAMLVL,ISERV
        DO 100 I=1,75
           READ(13'I)(IVAL(J),J=1,4)
           IUNIT(I,2)=IVAL(1)
           IUNIT(I,3)=IVAL(2)
           IUNIT(I,4)=IVAL(3)
           IUNIT(I,5)=IVAL(4)
100     CONTINUE
        PRINT*,' ZERO COUNTERS? (   YES  OR   NO   ) '
        READ(5,80)IANS
        IF(IANS .EQ. 'N  ' .OR. IANS .EQ. 'NO ')GO TO 300
           TCIST = INT(TIME)
           INTER(1) = 0
           INTER(2) = 0
           DO 200 I = 1,10
              ISERV(I) = 0
              IATP(I,16)  = 0            @ SERVER WITHHOLD COUNTER
              IASP(I,16)  = 0            @ SERVER WITHHOLD COUNTER
200        CONTINUE
  300   PRINT*,  ' MODIFY INTER, IDAY, TCILNG, ASP STATUS...'
   10   WRITE(6,20)
   15   FORMAT('    (1)-EDIT DATA FILES',/,
       $ '    (2)-UPDATE FA CURRENT SUPPLY (TO 100 PER CENT)',/,
       $ '    (3)-CLOSE ATP',/,
       $ '    (4)-MODIFY TRK QUE',/,
       $ '    (5)-PRINT TRUCK QUEUES',/,
       $ '    (6)-STOP')
  20    FORMAT('    ???')
        READ(5,*,ERR=25) IOPT
        IF(IOPT.LT.1.OR.IOPT.GT.6)GO TO 25
        GO TO (30,40,45,50,60,90),IOPT
   25   WRITE(6,15)
        GO TO 10
C
   30   CALL EDITD
        GO TO 10
C
```

```
       IF (IUNIT(K,1) .LT. 4 .OR. IUNIT(K,1) .GT. 5) GO TO 41
       DO 41 I = 8,125,13
         IUNIT(K,I+2) = 0
         IUNIT(K,I+3) = 0
         IUNIT(K,I+4) = IUNIT(K,I+1) * IUNIT(K,I+7)
  41  CONTINUE
      GO TO 10
C
C         **** THIS CODE MOVES.(CFA) ATP S&PS AND AMMO ****
   45 PRINT *,' ENTER (CFA)  ATP NUMBER TO BE CLOSED'
      READ (5,*) NATP
      NATPQ = 75 + NATP
   47 CALL GETQUE(NUMSP,NATPQ)
      IF (NUMSP .EQ. 0) GO TO 10
      PERCNT = ITRUCK(NUMSP,6)
      IF (PERCNT .LE. 0.) THEN
         CALL PUTQUE(NUMSP,176)
         GO TO 47
      END IF
      MIX = ITRUCK(NUMSP,5)
      NUMAM = MIX - LPPAR(3)
      IAMCOD = NUMAM * 3 + 18
      IF(MIX .EQ. 80)IAMCOD = 51  @  FUZES
      LEAST = 999999
      DO 48 J =1,3
C        AMAV = ONHAND - DEMAND + ON-THE-WAY
         AMAV = IATP(J,IAMCOD) - IATP(J,IAMCOD + 1) + IATP(J,IAMCOD + 2)
         IF (AMAV .GE. LEAST) GO TO 48
            LEAST = AMAV
            LATP = J
   48 CONTINUE
      NUMRDS = IMIX(MIX,NUMAM) * PERCNT / 10000
      IATP(NATP,IAMCOD) = IATP(NATP,IAMCOD) - NUMRDS
      IATP(LATP,IAMCOD) = IATP(LATP,I.MCOD) + NUMRDS
      CALL PUTQUE(NUMSP,LATP + 75)
      GO TO 47
C
   50 CALL TRKPUT
      GO TO 10
C
  60  CALL PRINT
      GO TO 10
C
   80 FORMAT(A3 )
C
   90 WRITE(4) IATP,IASP,IUNIT,ITRUCK,ITYPE,IMIX,INTER,
     $ IRSTME,IATPSD,IDAY,TIME,IATPAM,ICSA,LPPAR,IASPAM,LUOUT,
     $ TCIST,TCILNG,LOOK,IHFAD,ITEMS,AUNIT,JUNIT,JATP,JASP,
     $ IATPSP,IASPSP,IAMLVL,ISERV
      PRINT*,'  SSG ARMPL.DP WILL SYM THIS REPORT'
      STOP
      END
```

a.

```
          SUBROUTINE PRINT
           SUBROUTINE PRINT
C***** PRINTS OUT THE CONTENTS OF EVERY TRUCK QUEUE
C
C      CALLED BY EDIT
C      CALLS GETQUE, PUTQUE, NXTQUE
C
C***** D. HILLIS APR 79
C
       include quenum,list
       include quepnt.list
       DIMENSION NTRK(200)
       DO 70 I=1,176
          CALL NXTQUE(IFIRST,I)
          IF(IFIRST.EQ.0) GO TO 50
          DO 10 J=1,200
             CALL GETQUE(NTRK(J),I)
             CALL PUTQUE(NTRK(J),I)
             CALL NXTQUE(INEXT,I)
             IF(INEXT.EQ.IFIRST) GO TO 20
   10     CONTINUE
C
   20     WRITE(2,30) I
   30     FORMAT(/,5X,'QUEUE ',I3,' TRUCKS')
          WRITE(2,40) (NTRK(K),K=1,J)
   40     FORMAT(10(1X,I4))
          GO TO 70
   50     WRITE(2,30) I
          WRITE(2,60)
   60     FORMAT(5X,'NONE')
   70  CONTINUE
C
       RETURN
       END
```

3. Convert Program

```
      PROGRAM CONVRT
C
C     THIS PROGRAM CONVERTS TEVENTS, AN EVENTS FILE, WHICH IS IN
C     CHARACTER FORM TO A BINARY FILE FOR USE IN THE ARM PROGRAM
C
C **************************************************
      DIMENSION IRAY1(500),IRAY2(500),IRAY3(500),IRAY4(500)
      DIMENSION IRAY5(500),IRAY6(500),ARAY(500)
C
C
      DO 100 I=1,500
      IRAY1(I)=0                               @ EVENT TYPE
      IRAY2(I)=0                               @ IPARM(1)
      IRAY3(I)=0                               @ IPARM(2)
      IRAY4(I)=0                               @ IPARM(3)
      IRAY5(I)=0                               @ IPARM(4)
      IRAY6(I)=0                               @ IPARM(5)
      ARAY(I)=0.                               @ EVENT TIME
100   CONTINUE
C
      DO 500 I=1,500
      READ(12,*)IRAY1(I),IRAY2(I),IRAY3(I),IRAY4(I),IRAY5(I),
     ZIRAY6(I),ARAY(I)
500   CONTINUE
      WRITE(11)IRAY1,IRAY2,IRAY3,IRAY4,IRAY5,IRAY6,ARAY
      PRINT*,'FILE 11 IS NOW COMPLETE
C
      STOP
      END
```

4. ADDEVT Program

```
      PROGRAM ADDEVT
C
C     THIS PROGRAM ALLOWS ENTRY OF EVENTS FOR ARM
C     INTERACTIVELY SEPARATE FROM THE MAIN PROGRAM.
C     THESE EVENTS ARE THEN STORED IN A FILE 12 CALLED
C     TEVENTSCI--.  THIS IS A SOURCE FILE WHICH CAN
C     THEN BE TAKEN INTO CTS EDITOR AND CORRECTIONS MADE.
C
C*******************************************************
C
C       VARIABLES USED:
C        ITYPE.....THE NUMBER OF THE EVENT
C        IPARM1,IPARM2,IPARM3,IPARM4,IPARM5
C        ....THE ASSOCIATED PARAMETERS OF THE EVET
C
C       FILES USED:  12 THE SOURCE FILE WHICH IS CALLED
C        WHEN ALL EVENTS ARE ENTERD FROM KEYBOARD.
C
C****************************************************
C
      DIMENSION ITYPE(500),IPARM1(500),IPARM2(500),IPARM3(500)
      DIMENSION IPARM4(500),IPARM5(500),STIME(500)
      CHARACTER*3 IANSW
C
      DO 100 I=1,500
         ITYPE(I)=0
         IPARM1(I)=0
         IPARM2(I)=0
         IPARM3(I)=0
         IPARM4(I)=0
         IPARM5(I)=0
         STIME(I)=0.
100   CONTINUE
C
C       SET INITIAL CONTER TO 1 AND PROMPT FOR EVENTS TO BE ENTERED
C
      ICOUNT=1
      PRINT*,'ENTER EVENT TYPE,PARMS,TIME,SEPARATED BY COMMAS'
      PRINT*,'ENTER 0,0,0,0,0 TO COMPLETE ADDITION OF EVENTS'
2     PRINT*,'?'
C
      READ*,ITYPE(ICOUNT),IPARM1(ICOUNT),IPARM2(ICOUNT),IPARM3(ICOUNT),
     ZIPARM4(ICOUNT),IPARM5(ICOUNT),STIME(ICOUNT)
      IF(ITYPE(ICOUNT).EQ.0)GO TO 3
      IF(ITYPE(ICOUNT).LT.0 .OR. ITYPE(ICOUNT).GT.17)THEN
         PRINT*,'INCORRECT EVENT TYPE'
         GO TO 2
      END IF
      ICOUNT=ICOUNT+1
      GO TO 2
C
3     PRINT*,'DO YOU WISH TO SEE EVENTS---Y OR N'
      READ(5,22) IANSW
      IF(IANSW.EQ.'Y  '.OR.IANSW.EQ.'Y  ')THEN
         DO 111 J=1,ICOUNT
         PRINT 11,ITYPE(J),IPARM1(J),IPARM2(J),IPARM3(J),IPARM4(J),
     Z   IPARM5(J),STIME(J)
11       FORMAT(2X,I3,T7,'IPARMS= ',5I5,' SCHEDULED TIME = ',F8.1)
111      CONTINUE
      END IF
C
C******* NOW PUT EVENTS ON FILE IF DESIRED
      PRINT*,'PUT EVFNTS ON FILE 12---Y OR N'
      READ 22,IANSW
      IF(IANSW.EQ.'Y  '.OR.IANSW.EQ.'Y  ')THEN
         DO 222 I=1,500
         WRITE(12,*)ITYPE(I),IPARM1(I),IPARM2(I),IPARM3(I),IPARM4(I),
     Z   IPARM5(I),STIME(I)
222      CONTINUE
         PRINT*,'EVENTS NOW ON FILE 12'
      END IF
C
      STOP
      END
```

5. Information

```
      SUBROUTINE INFORM
C                    AMMUNITION RESUPPLY MODEL (ARM)
C
C
C
C
C
C     ****************   AUNIT   *********************
C
C     AUNIT(75,2)
C              75 UNITS
C               2 ALPHA FIELDS/UNIT
C      COLUMN 1 = UTM COORDINATES
C      COLUMN 2 = ALPHA UNIT NAMES
C
C
C
C      ***************   ATP DATA   *******************
C
C      IATP (10,53)
C                  10 ATP
C                  53 WORDS EACH AS FOLLOWS:
C
C      1. DISTANCE TO CSA
C      2. DISTANCE TO ASP
C      3. DIS TO DAO
C      4.
C      5. number of arriving s & p tractors used for return
c             of empty trailers
C      6. ASSOCIATED ASP NUMBER
C      7. QUE FOR ASP S&P
C      8. NO OF MLRS TRUCKS BEING SERVED
c      9. que for csa s&p
C     10. SERVERS QUEUE NUMBER
C     11. ARTILLERY QUEUE NUMBER
C     12. MANUEVER UNIT QUEUE NUMBER
C     13. CONVOY COUNTER AT CSA(IF .GE. 3, SCHEDULER CONVOY FORWARD)
C     14. NUMBER TRUCKS IN ARTILLERY QUEUE
C     15. NUMBER TRUCKS IN MANUEVER UNIT QUEUE
C     16. SERVER REMOVAL KOUNTER
C     17. NUMBER OF CONVOYS SENT FROM CSA
C     18.
C     19.
C     20. NUMBER OF TIMES A SERVER NOT AVAILABLE
C     21. CURRENT AMMO SUPPLY, AMMO 1    (NUMAM*3+18)
C     22. QUEUE AMMO DEMAND, AMMO 1       (NUMAM*3+19)
c     23.  ON-THE-WAY (FROM DAO)          (NUMAM*3+20)
C     24-26       AMMO 2
c     27-29       ammo 3
c     30-32       ammo 4
c     33-35       ammo 5
c     36-38       ammo 6
c     39-41       ammo 7
```

```
c     45-47        ammo 9
c     48-50        ammo 10
C     51            FUZES
C
C
C
C
C      IATPSD(5)  -- ATP SERVICE DATA
C
C      1.  lowest asp-atp round-robin s&p number
C      2.  ATP 1ST PRIORITY S & P QUEUE
C      3.  ATP 2D PRIORITY S & P QUEUE
C      4.  CFA ATP OWNER NUMBER
C      5.
C
C
C       ******** IATPSP  TO OBTAIN ASP % REPLENISHMENT *******
C
C       IATPSP(10,22)
C           11 ATP
C           1 - 11  #CSA S&Ps ARRIVING BY AMMO TYPE
C           12 - 22  #ASP S&Ps ARRIVING BY AMMO TYPE
C
C
C     ****************   ASP DATA   *******************
C
C      IASP (10,110)
C                   10 ASP
C                  110 WORDS EACH AS FOLLOWS:
C
C      1. DISTANCE TO CSA
C      2. ASP STATUS:
C        -1 INACTIVE    0 ACTIVE/NO CONVOYS   1 ACTIVE/CONVOYS
C      3. CUMULATIVE HELICOPTER COUNTER
C      4.  QUEUE FOR CSA-ASP S&P TRUCKS
C      5. NUMBER TRUCKS TO CSA
c      6. NUMBER OF EMPTY S & Ps AT ASP
C      7. SERVERS QUEUE NUMBER
C      8. NUMBER MLRS BEING SERVED
C      9. ROUTINE QUEUE NUMBER
C      10. MLRS QUEUE NUMBER
C      11. REAR ASP NUMBER
C      12. NUMBER TRUCKS IN ROUTINE QUEUE
C     13. NUMBER TRUCKS IN MLRS QUEUE
C     14. CONVOY COUNTER AT CSA (IF .GE. 7, SCHEDULE CONVOY FORWARD)
C     15. HELICOPTER SERVER COUNTER
C     16. SERVER REMOVAL COUNTER
C     17. NUMBER OF CONVOYS SENT FROM CSA
C     18. QUEUE FOR ASP-ATP ROUND ROBIN S & P S
C     19.
C     20. NUMBER OF TIMES A SERVER NOT AVAILABLE FOR UNIT TRUCK
C     21. CURRENT AMMO SUPPLY, AMMO 1                  (NUMAM*3+18)
C     22. QUEUE AMMO DEMAND, AMMO 1                    (NUMAM*3+19)
C     23. AMMO ON THE WAY (FROM CSA OR DAD), AMMO 1    (NUMAM*3+20)
```

```
C
C
C
C
C
C      ******** IASPSP TO OBTAIN # S & P ARRIVALS BY AMMO TYPE ********
C
C      IASPSP(10,30)
C               10 ASP
C               30 AMMO TYPES
C
C
C       IATPAM (10,40)     AMMO REMOVED FROM ATP
C                        10 ATP, 10 AMMO TYPES
C
C                  1 - 10 10 TON TRUCKS SERVICED  (MLRS W/ TLR)
C                 11 - 20  5 TON TRUCKS SERVICED  (MLRS W/O TLR)
C                 21 - 30 10 TON TRUCKS BUMPED
C                 31 - 40  5 TON TRUCKS BUMPED
C
C
C
C       IASPAM(10,120)     AMMO REMOVED FROM ASP
C                        10 ASP, 30 AMMO TYPES
C
C
C                  1 - 30  10 TON TRUCKS SERVICED
C                 31 - 60   5 TON TRUCKS SERVICED
C                 61 - 70  ATP S & P SERVICED
C                 71 - 80  # CSA-ATP ARRIVALS
C                 90       # HELI LOADS REMOVED
C                 91 - 120 # CSA-ASP S & PS ARRIVED
C
C
C
C      IAMLVL(2,30)     STOCKAGE OBJECTIVES
C
C            1 / 1 - 10  ATP S O
C            2 / 1 - 30  ASP S O
C            1,29  MAX ATP STOCKAGE %
C            1,30  MAX ASP STOCKAGE %
C
C
C
C
C      ISERV(10)   SERVER MANIPULATIONS
C
C         1. # ATP SERVERS TO BE HELD (AS FOR DISPLACEMENT - ALL ATPS)
C         2. # ASP SERVERS TO BE HELD (AS FOR DISPLACEMENT - ALL ASPS)
C         3. ATP SERVER HOLD QUEUE
C         4. ASP SERVER HOLD QUEUE
C         5. INTERDICTED ATP #
C         6. INTERDICTED ASP #
C         7. MINUTES SERVERS TO BE HELD IN HOLD QUEUE AT ATP
```

```
C        9.
C        10.
C
C
C     IUNIT (75,142)
C                     75 UNITS
C                     142 WORDS EACH AS FOLLOWS:
C
C      1. TYPE
C      2. ATP NUMBER
C      3. ASP NUMBER
C      4. DISTANCE TO ATP
C      5. DISTANCE TO ASP
C      6. TIME THAT THE LAST TRUCK FOR THIS UNIT WAS INTROKED
C      7. HELO MISSIONS RECEIVED
C      8. FIRST AMMO TYPE
C      9. NUMBER WEAPONS ALIVE,                 FIRST AMMO TYPE
C     10. NUMBER WEAPONS SHORT AMMO ,           FIRST AMMO TYPE
C     11. NUMBER ROUNDS SHORT,  (WPNS)          FIRST AMMO TYPE
C     12. CURRENT AMMO SUPPLY,  (WPNS)          FIRST AMMO TYPE
C     13. ROUTINE RESUPPLY LEVEL,  (PER WPN)    FIRST AMMO TYPE
C     14. CRITICAL RESUPPLY LEVEL,  (PER WPN)   FIRST AMMO TYPE
C     15. BASIC AMMO LEVEL,  (PER WPN)          FIRST AMMO TYPE
C     16. AMMO ON TRUCKS,                       FIRST AMMO TYPE
C     17. NUMBER OF WEAPONS KILLED AT THE END OF CI, 1ST AMMO TYPE
C     18. NUMBER OF WEAPONS SHORT AMMO             FIRST AMMO TYPE
C     19. TOTAL ROUNDS SHORT THROUGH WHOLE CI      FIRST AMMO TYPE
C     20. STORAGE FOR NO. RDS RESUPPLY ENROUTE
C     21-33              ,SECOND AMMO TYPE
C     34-46              ,THIRD AMMO TYPE
C     47-59              ,FOURTH AMMO TYPE
C     60-72              ,FIFTH AMMO TYPE
C     73-85              ,SIXTH AMMO TYPE
C     86-98              ,SEVENTH AMMO TYPE
C     99-111              ,EIGHTH AMMO TYPE
C     112-124              ,NINTH AMMO TYPE
C     125-137              ,TENTH AMMO TYPE
C     138. NUMBER OF HELICOPTERS ASSIGNED
C     139.  = 0 IF SINGLE PULSE DEMAND PER CI
C          = 1 IF MULTIPLE PULSES PER CI
C     140-142  COUNTERS
C
C
C      IRSTME(23,3)    --   RESUPPLY TIME DATA
C                          23 TYPES OF AMMO
C                          3 WORDS EACH AS FOLLOWS
C
C      1. WEAPON SET-UP TIMF
C      2. LOAD TIME PER ROUND
C      3. TRAVEL TIME TO WEAPON
C
C
C
C
```

```
C
C     ITRUCK (1400,15)
C                     1400 TRUCKS
C                       15 WORDS EACH AS FOLLOWS:
C
C     1. TRUCK TYPE
C     2. MISSION TYPE
C     3. STATUS TYPE
C     4. OWNER NUMBER
C     5. AMMO MIX NUMBER   //  SERVER OFF-LOAD TIME AT ASP
C     6. PERCENT LOADED      //  SERVER LOAD TIME
C     7. TIME SINCE LAST FAILURE
C
C     TRUCK COUNTERS:          UNIT   CSA-ATP CHA-ASP ASP-ATP
C     8.   1  #FAILURES
C     9.   2  #INTERDICTIONS
C    10.   3  #ARRIVALS FROM:  ASP/ATP   CSA    CHA   ASP
C    11.   4                   #RELOADS   # * @ CSA  #:HRU-PUTS AT ASP
C    12.   5  QUEUE TIME       ASP/ATP   CSA    CSA   ASP
C    13.   6                   (* BUMPED  (TIME AT IN   (* AT ASP)
C                             TO 2D ASP) ATP/ASP Q)
C    14.   7                    (*BUMPED   #*MPTY@ASP  (* BUMPED
C                             TO ASP)                 TO REAR ASP)
C    15.   8                    (* >3 IN
C                               MLRS QUE
C     SERVER COUNTERS:
C        1  #FAILURES
C        2  #S & P OFF-LOADS
C        3  #ASP-ATP S & P LOADUPS
C        4  #  5TON LOAD UPS
C        5  # 10TON LOAD UPS
C        6  # LOAD UPS FROM CSA S & PS
C        7
C        8
C
C     ITYPE (9,6)
C                  9 TYPES OF TRUCKS
C                  6 WORDS FOR EACH TYPE TRUCK AS FOLLOWS:
C
C       1. SECONDARY ROAD NIGHT SPEED (UNIT TO ASP,ATP)
C       2. SECONDARY ROAD DAY SPEED (UNIT TO ASP,ATP)
C       3. HIGHWAY NIGHT SPEED
C       4. HIGHWAY DAY SPEED
C       5. MTBF
C       6. MTTR
C
C
C     TRUCK QUEUES:    QUEUE TYPF:
C
C       1 - 75             1       AT EACH UNIT
C      76 - 85              2       AT ATPS FOR CSA-ATP S & PS
C      86 - 95              3       AT ATPS FOR ASP-ATP S & PS
C      96 - 105             4       AT ATPS FOR UNIT ARTILLERY SERVER
C     106 - 115             5       AT ATPS FOR UNIT MANUEVER SERVER
```

```
C     126 - 135              7       AT ASPS FOR CSA-ASP S & PS
C     136 - 145              8       AT ASPS FOR ROUTINE UNIT TRUCKS
C     146 - 155              9       AT ASPS FOR MLRS UNIT TRUCKS
C     156 - 165             10       at asps for servers
C     166 - 175             11       AT ASPS FOR ASP-ATP S & PS
c     176                   12       AT CSA FOR CSA S & PS
C
C
C
C
C
C     ********************   AMMO DATA   ********************
C
C     IMIX(91,32)
C                   91 AMMO MIXES
C                  1 - 30  10TON MIXES
C                 31 - 60   5TON MIXES
C                 61 - 90  S & P MIXES
C                 91       HELICOPTER MIX
C                   32 WORDS FOR EACH MIX AS FOLLOWS:
C
C     1-30  NUMBER ROUNDS OF EACH AMMO TYPE
C     31. LOAD TIME AT CSA/ATP
C     32. LOAD TIME AT ASP
C
C
C
C
C
C
C
C
C
C     ******************  MISC DATA  ********************
C
C
C      EVENT SCHEDULING
C     COMMON/EVENTS/ JSTAT(6), JEVDS(2048,4), IEVS(5,2048)
C
C
C      QUEUE DATA
C                          COMMON /QUENUM/ IHEAD(176)
C                          COMMON /QUEPNT/ ITEMS (1400)
C
C
C     INTERDICTION DATA -   COMMON INTER(10)
C         1  COUNTER FOR ZONE 1 TRUCKS KILLED IN INTRDK
C         2  COUNTER FOR ZNNE 2 TRUCKS KILLED IN INTRDK
C         3  NUMBER OF TRUCKS TO BE KILLED IN ZONE ONE
C         4  NUMBER OF TRUCKS TO BE KILLED IN ZONE 2
C         5  TIME TO REPLACE TRUCK IN ZONE 1
C         6  TIME TO REPLACE TRUCK IN ZONE 2
C         7  MODULO OF TRUCKS TO BE KILLED IN ZONE 1
C         8  MODULO OF TRUCKS TO BE KILLED IN ZONE 2
```

```
C          10  NUMBER OF ZONE TWO TRUCKS ENTERING INIRDK
C
C       IDAY  1 = DAY    ,    0 = NIGHT
C
C       ICSA(3,32) -- NUMBER OF ROUNDS BY AMMO TYPE FROM CSA
C
C            (1,1-11)  # S&Ps TO ATP
C            (2,1-30)  # S&Ps TO ASP
C            (3,1-30)  CUMULATIVE AMMO DEMAND OF ALL UNIT
C
C               1-30  AMMO TYPES
C               2,31  COUNTER FOR EMPTY S & Ps AT CSA
C               3,32  COUNTER FOR EMPTY POL TRUCKS AT CSA
C
C
C
C       LPPAR(1)   -- TOTAL NUMBER OF AMMO CODES     (30)
C       LPPAR(2)   -- NUMBER OF AMMO CODES AT ATP      (10)
C       LPPAR(3)   -- NUMBER OF MANEUVER UNIT AMMO CODES AT ATP(3)
C       LPPAR(4)   -- NUMBER OF TRANSPORTS(TRUCKS)      (LT 1400)
C       LPPAR(5) -- NUMBER OF HELICOPTERS AVAILABLE     (10)
C       LPPAR(6) -- NUMBER OF AMMO TYPES AT UNITS(LE 10)
C      LPPAR(7) -- NUMBER TO SUBT FROM STON MIX TO GET AMMO TYPE(NUMAM)
C      LPPAR(8) -- NUMBER TO SUBT FROM S&P MIX TO GET AMMO TYPE(NUMAM)
C
C
C      TCIST   --  TIME OF START OF CI IN DECIMAL MINUTES
C#$%&#$%&#$%& TCIST MUST BE .0005 FOR CI01 !!!!)
C
C      TCILNG  --  TIME OF LENGTH OF CI IN DECIMAL MINUTES
C
C
C
C      TIME  --  SIMULATION TIME IN MINUTES (DECIMAL)
C
C
C
C      ********************  TYPE CODE DATA  *******************
C
C
C      UNIT TYPE CODES:
C
C       1     TANK TASK FORCE
C       2     MECH TASK FORCE
C       3     ARMRD CAV SQDN
C       4     155 ARTY BTRY
C       5     8 INCH ARTY BTRY
C       6     MLRS BTRY
C       7     DIVAD GUN PLT
C       8     CBT AVN PLT
C
C
C
C      TRUCK TYPE CODES :
```

```
C      1    10 TON
C      2    5 TON
C      3    5 TON WITH 1 1/2  TON TRAILER
C      4    10 TON WITH 10 TON TRL.
C      5    22 TON STAKE & PLATFORM
C      6    HELICOPTER
c      7    GOER
c      8    ROUGH TERRAIN FORKLIFT
c      9    CRANE
C
C
C
C     AMMO TYPE CODES :
C
C      1     105 MM     (M60-A3/XM1)
C      2     TOW
C      3     POWDER CANISTERS
C      4     155 HE
C      5     155 ICMDP
C      6     8 INCH HE
C      7     8 INCH ICMDP
C      8     8 INCH  POWDER
C      9     HELLFIRE
C     10     MRLS
C     11     155 RAP
C     12     155 CLGP
C     13     155 SMOKE
C     14     30mm(AAH)
C     15     8 INCH RAP
C     16     MORTAR
C     17     BUSHMASTER
c     18     DIVAD
c     19     SMALL ARMS
c     20     FUZES
C
C
C
C
C      ************ TYPE CODE DATA  (CONTINUED)  ****************
C
C      TRUCK MISSION TYPE CODES :
C
C      1   UNIT TRUCK
C      2   CSA - ATP LINK
C      3   CSA - ASP LINK
C      4   ASP - ATP LINK
C      5   ASP - UNIT  (HELICOPTER)
c      6   ATP SERVER
C      7   ASP SERVER
C
C
C
C      TRUCK STATUS TYPE CODES :
C
```

```
C      2   IN ATP QUEUE
C      3   IN ASP QUEUE
C      4   IN TRANSIT  --  OR BUSY IF SERVER
C      5   UNIT TRUCK GOING FROM ATP TO ASP  -- SERVER MOVING TO NEW LOCATION
C      6   TRUCK AWAITING REPAIR
C      7   TRUCK DEAD (INTERDICTED)
C      8   IN CSA QUE
C      9   BUMPED TO 2D ASP   --  SERVER OF INTERDICTED ASP/ATP
C
c     *************** data for turnaround times and queue waits ********
c
c
c     ******************** junit ************************
c
c      junit(8,24)
c      for the 8 types of units the following
c
c      1. number of trucks sent to the atp from the unit
c      2. number of trucks killed on that move
c      3. number failed on that move
c      4. total travel time for all trucks on that move
c      5. number of trucks sent to the asp from the unit
c      6. number of trucks killed on that move
c      7. number failed on that move
c      8. total travel time for all trucks on that move
c      9. number of trucks sent to the asp from the atp
c     10. number killed on that move
c     11. number failed on that move
c     12. total travel time for all trucks on that move
c     13. number of trucks sent to the unit from the atp
c     14. number killed on that move
c     15. number failed on that move
c     16. total travel time for all trucks on that move
c     17. number of trucks sent to the unit from the asp
c     19. number failed on that move
c     20. total travel time for all trucks on that move
c     21. total time spent in reloading weapons
c     22. total time available for unit trucks
c     23. number of trucks killed during reload
c     24.
c
C
c
c
c
c     ********************* jatp ************************
c
c      jatp(10,6)
c      for the 10 different atps the following:
c
c      1. number of trucks served by the manuver queue
c      2. total queue wait time for all trucks served
c      3. maximum wait time for the manuver queue
c      4. trucks served through the artillery queue
```

```
c       6. maximum wait time for the artillery queue
c
c
c
c
c
c     ********************* jasp *************************
c
c
c       jasp(10,9)
c       for the 10 different asps the following:
c
c       1. trucks served through the routine queue
c       2. total wait time for all trucks served
c       3. maximum wait time in the routine queue
c       4. trucks served through the mlrs queue
c       5. total wait time for all trucks served
c       6. maximum wait time in the mlrs queue
c       7. trucks served through the ASP-ATP queue
c       8. total wait time for all trucks served
c       9. maximum wait time in the ASP-ATP queue
c
c       end
c
      end
```

6. Demand Generation Program

```
C                        *** RANMOD ***
C      RANMOD creates and edits ammunition demand files for the
C      ARM model and generates new demand. Files are assigned
C      in an SSG runstream (RUNS). RANMOD can run independently,
C      but only temporary files are created and data is not stored.
C                  ************************
C                        DATA SECTION
C                  ************************
C         INV holds the input values:
C      INV:     no change,  MOPP*100,   intensity,  phase,
C               rets indx,  change,     method,     1st unit,
C               last unit,  cur unit,   1st copy,   last copy,
C               file trtmnt,ammo code,  no. of CI's
C         IWPV holds values which change for each wpn in the unit.
C      IWPV:    wpn sys code,  max exp limit,  min exp limit,
C               initial draw,  phase  draw,    exp rate diff,
C         IND holds the status for options available (CHNGS)
C         (1=do change; 0=don't change).
C      IND:  alive, short, wpn type, ah's, mnt ret, war res,
C               inst dmd, copy, print, save, demand, by ammo code,
C         IAMAT holds the attributes for the specified unit in
C         the specified CIs. It is the window for the files.
C      IAMAT:  ammo code, wpns alive, wpns short, ahs, demand
C      KROW and KCOL = row and col indices for IAMAT.
C      IANS used primarily for user responses.
C      LEAP holds the  offset for the INFO subroutine.
C      MNT and KMB: mnt rets & war reserves; RETS: total rets
C      WPN holds the name of each weapon in the unit.
C      AMON holds the name of any new ammo type.
C      RNDS: rounds/tube; RNDT: tot rnds (RNDS*wpns short).
C      DRAW and CUM = intermediate steps for RNDT
C      NOCI holds the CI number (1-55) of each CI involved.
C      DRN holds the phase categories (day, night).
C
       DIMENSION IAMAT(30,3),NOCI(3),RNDS(6,3),IND(12),KMB(6,3),MNT(6,3)
       DIMENSION IFIL(3), AMON(6),INV(15),IWPV(6,6),RNDT(3),DRN(2),WPN(6)
       DIMENSION KWPSYS(14),WPSYS(14),MAXAR(13,7),MINAR(13,7),UNAME(75)
       DIMENSION KHW(6),MAXV(12),CHNGS(12),PER(8),LOAD(14),IHOWL(13
C
       CHARACTER*8 UNAME
       CHARACTER*10 WPSYS,CHNGS,AMON,WPN
       CHARACTER*5 DRN
C
C         MAXV holds upper limits for testable variables:
C      MAXV:    CI no.,     MOPP*100,   intensity,  phase,
C               ret opts,   operation,  method,     unit no.,
C               wpn sys,    status,     file size,  no of CIs
C
       DATA MAXV/55,100,8,2,4,5,3,.5,14,12,30,3/
C
C         MAXAR and MINAR hold ammo expenditure limits for the 13
C         standard wpn types included in the data base.
```

```
      DATA ((MAXAR(I,J),J=1,7),I=1,13)
     Z/  93,  60,  35,  56,  30,  87,   0,
     A  400, 240, 360,   0,   0,   0,   0,
     B 1200, 720,1100,   0,   0,   0,   0,
     C   20,  12,   8,  15,   5,  20,   0,
     D   12,   8,  10,   8,   4,  12,   0,
     E  420, 295, 135, 232,  84, 350,   0,
     F  750, 480, 200, 480, 200, 300,   0,
     G  380, 261, 186,   0,   0, 380,   0,
     H  550, 375, 250,   0,   0, 550,   0,
     I  210, 145, 100,   0,   0, 210,   0,
     J  720, 458, 300,   0,   0, 630,   0,
     K   16,  16,  16,  16,  16,  16,  16,
     L  500, 500, 500, 500, 500, 500, 500/
C
      DATA ((MINAR(I,J),J=1,7),I=1,13)
     Z/  35,  24,  10,  15,   5,  30,   0,
     A  200, 120, 180,   0,   0,   0,   0,
     B  700, 420, 650,   0,   0,   0,   0,
     C    8,   5,   4,   3,   1,   8,   0,
     D    5,   2,   2,   2,   1,   5,   0,
     E  240, 135,  80,  92,  24, 190,   0,
     F  550, 300,  60, 300,  60, 100,   0,
     G  300, 181,  86,   0,   0, 300,   0,
     H  450, 275, 150,   0,   0, 450,   0,
     I   75,  85,  50,   0,   0, 150,   0,
     J  540, 298, 180,   0,   0, 450,   0,
     K   12,  12,  12,  12,  12,  12,  12,
     L  400, 400, 400, 400, 400, 400, 400/
C
C        Unit names
C
      DATA UNAME/'TF1A    ','TF2A    ','TF3A    ','TF4A    ','TF5A    ',
     a'TF6A    ','TF7A    ','TF8A    ','TF1M    ','TF3M    ','TF2M    ',
     b'TF4M    ','TF5M    ','TF6M    ','12ACR   ','13ACR   ','FA12ACR ',
     c'FA13ACR ','A11FA   ','B11FA   ','C11FA    ,'A12FA   ','B12FA   ',
     d'C12FA   ','A13FA   ','B13FA   ','C13FA   ','A14FA   ','B14FA   ',
     e'C14FA   ','A15FA   ','B15FA   ','C15FA   ','A16FA   ','B16FA   ',
     f'C16FA   ','A17FA   ','B17FA   ','C17FA   ','A18FA   ','B18FA   ',
     g'C18FA   ','A19FA   ','B19FA   ','C19FA   ','A20FA   ','B20FA   ',
     h'C20FA   ','A21FA   ','B21FA   ','C21FA   ','A22FA   ','B22FA   ',
     i'C22FA   ','A23FA   ','B23FA   ','C23FA   ','A24FA   ','B24FA   ',
     j'C24FA   ','A25FA   ','B25FA   ','C25FA    , A26FA    , B26FA   ',
     k'C26FA   ','A1ADA   ','B1ADA   ','C1ADA   ','12ADA   ','13ADA   ',
     l'1ACAS   ','2ACAS   ','3ACAS   ','        '/
C
C        Weapon system names
C
      DATA WPSYS/  '105MM TANK','50CAL TANK','7.62 MG   ','CFV TOW   ',
     Z'IFV TOW   ','MORTAR    ','BUSHMASTER ,'8-IN HOW  ','155 HOW   ',
     A'MLRS      ','DIVAD     ','HELLFIRE  ','30MM ATK H','OTHER     '/
C
C        KWPSYS holds ammo codes for each wpn type; KHW holds
C        ammo codes for howitzers.  They = IAMAT, col 1.
```

```
      DATA KWPSYS/ 1,23,24, 2,25,16,17, 6, 4,10,13, 9,14,99/
C
C        Names of available options. Values held in IND array.
C
      DATA CHNGS/ 'WPNS ALIVE','WPNS SHORT','WPN TYPE  ','ATK HELIS ',
     Z            'MAINT RET ','COMBAT RSV','INS DEMAND','COPY UNIT ',
     Z            'AUTO LIST ','AUTO SAVE ','NEW DEMAND','R/ AMMO NO'/
C
      DATA (INV(I),I=1,15)/0,100,1,1,11*0/, MNT,KMB/36*0/
C        IFIL holds base no for input and output units (files)
C     IFIL:   binary read,  binary write, report file
      DATA WPN,AMON/12*'          '/, IFIL/8,11,14/
      DATA IND /12*0/, IWPV/36*0/, RNDS/18*0.0/, RNDT/3*0.0/
C        Basic load factors for wpn systems, used for calculating
C        demand increases due to mnt returns and combat reserves.
      DATA LOAD/1,0,0,12,6,115,350,0,0,12,1078,16,1200,0/
      DATA IHOWL/21,83,14,5,5,8,30,6,2,2,10,34,6/
C
C        PER holds percentages for howitzer ammo types.
      DATA PER/0.16,0.65,0.11,0.04,0.04,0.20,0.68,0.12/
      DATA IAMAT/90*0/, NOCI/3*' '/, DRN/' DAY ','NIGHT'/
      DATA IANS,LEAP/2*0/, KROW,KCOL/2*1/, RETS,DRAW,CUM/3*0.0/
C
C        ******************************************
C                ****** MAIN PROGRAM ******
C        ******************************************
C        Determine how the files will be handled.
1000     LEAP=8
         PRINT*, ' ENTER FILE TREATMENT. (INFO=0)'
         WRITE(6,1001)
1001     FORMAT(/,1X,'1. NEW FILES FROM OLD.   2. NEW FILES,'
     z         'FROM SCRATCH.   3. COPY SECTIONS.')
            READ*, INV(13)
            IF(INV(13).EQ.0)CALL INFO(LEAP,*1000)
            CALL VERIFY(INV(13),3,*1000)
C           **********
C        Enter the no. of CIs, each CI no. and verify. CI nos
C        are for listings only. There is no affect on files.
      LEAP=6
30    PRINT*, ' ENTER THE NO. OF CIS AND EACH CI NO. (INFO=0,0)'
         READ*, INV(15),(NOCI(I),I=1,INV(15))
            IF(INV(15).EQ.0)CALL INFO(LEAP,*30)
            CALL VERIFY(INV(15),MAXV(12),*30)
            IANS=0
            DO 39 I=1,INV(15)
               IF(NOCI(I).LT.1.OR.NOCI(I).GT.MAXV(1))IANS=-1
39          CONTINUE
            CALL VERIFY(IANS,0,*30)
C           **********
C        open the files
      DO 32 I = 1,INV(15)
         OPEN(UNIT=(IFIL(1)+I),ACCESS='DIR',RCDS=MAXV(8),RECL=MAXV(11),
     z         ASSOC=NRED)
         OPEN(UNIT=(IFIL(2)+I),ACCESS='DIR',RCDS=MAXV(8),RECL=MAXV(11),
32    CONTINUE
C           **********
         IF(INV(13).EQ.2)THEN
            CALL NUFILE
            CALL UNTNOS
         ELSE
            IF(INV(13).EQ.1)CALL COPFIL   @Copy read files
            CALL METHUD                 @Establish method
            CALL UNTNOS                 @obtain unit nos.
         ENDIF
C     .     **********
60    CALL BRANCH                 @branch to chosen method
90    LEAP=NXTSTP(dummy)          @determine next step
C
      GOTO(92,93,94,95,96,97)LEAP
93       CALL METHUD              @change methods
92       CALL UNTNOS              @new unit nos, same method
         GOTO 60
C
94       CALL COPYUN(*90)         @copy sequence of units
C
95       CALL NUCI(*1000)         @new run
C
96       CALL PRNTFL(*90)      @print file (DPFO or screen)
C
97    DO 98 I=1,INV(15)
         CLOSE(UNIT=(IFIL(1)+I))
         CLOSE(UNIT=(IFIL(2)+I))
98    CONTINUE
      PRINT*, ' PROGRAM IS FINISHED.'  @ftpo
         STOP
C
C           ****************************************
C                *****  SUBROUTINE SECTION  *****
C           ****************************************
      SUBROUTINE METHUD
C        Set counter (LEAP) for use with INFO routine.
C        Obtain type of operation and method to be used.
C        Test reponses for validity.
100    LEAP=1
      PRINT*, ' ENTER OPERATION AND METHOD. (INFO=0,0)'
      PRINT*, ' TYPE OF OPERATION:      METHOD TO BE USED:'
      PRINT*, ' 1 = EDIT/NEW DEMAND     1 = UNITS IN SEQUENCE'
      PRINT*, ' 2 = COPY SEQUENCES      2 = UNITS AT RANDOM'
      PRINT*, ' 3 = PRINT FILES         3 = UNITS BY GROUP'
      PRINT*, ' 4 = CHANGE BY ROW'
C     PRINT*, ' 5 = CREATE NEW FILES'   @Assigned in NUFILE
            READ*, INV(6), INV(7)
         IF(INV(6).EQ.0.OR.INV(7).EQ.0)CALL INFO(LEAP,*100)
         CALL VERIFY(INV(6),MAXV(6),*100)
         CALL VERIFY(INV(7),MAXV(7),*100)
      RETURN
C     END            METHOD
C           ****************************************
```

```
C        Set LEAP for use with info routine.
C        User enters the range of unit numbers (1st and lst
C        nos. when METHOD = sequence or group, one no. when
C        METHOD = random.
35    LEAP=3
      IF(INV(7).NE.2)THEN
         PRINT*, ' ENTER FIRST AND LAST UNIT NOS. (INFO=0,0)'
            READ*, INV(8),INV(9)
            CALL VERIFY(INV(8),INV(9),*35)
      ELSE
         PRINT*, ' ENTER UNIT NUMBER. (INFO=0)'
            READ*,INV(8)
               INV(9)=INV(8)         @Initialize last unit no.
      ENDIF
      IF(INV(8).EQ.0)CALL INFO(LEAP,*35)
      INV(10)=INV(8)                 @Initialize current unit no.
      CALL VERIFY(INV(9),MAXV(8),*35)
      RETURN
C     END             UNTNOS
C        *********************************************
      SUBROUTINE NUFILE
C        When FILE TREATMNT = 2, initialize new file.
80       CALL ZOT
         DO 83 L=1,INV(15)
            DO 84 K=1,MAXV(8)
         WRITE(UNIT=(IFIL(2)+L),REC=K,ERR=89) (IAMAT(J,L),J=1,MAXV(11))
84          CONTINUE
83       CONTINUE
         INV(6)=5
         LEAP=9
85       PRINT*, ' ENTER METHOD TO BE USED. (INFO=)'
         PRINT*, ' 1. UNITS IN SEQUENCE  2. RANDOM UNITS  3. GROUPS'
            READ*, INV(7)
               IF(INV(7).EQ.0)CALL INFO(LEAP,*85)
               CALL VERIFY(INV(7),MAXV(7),*85)
         RETURN
89          CALL FILERR(*80)
C     END            NUFILE
C        **************************************
      SUBROUTINE COPFIL
C     When FILE TRTMNT = 1, copy read file into write file.
         DO 209 J=1,INV(15)
207         DO 208 I=1,MAXV(8)
         READ(UNIT=(IFIL(1)+J),REC=I,ERR=28)(IAMAT(L,J),L=1,MAXV(11))
         WRITE(UNIT=(IFIL(2)+J),REC=I,ERR=28) (IAMAT(L,J),L=1,MAXV(11))
208         CONTINUE
209      CONTINUE
         RETURN
28          CALL FILERR(*207)
C     END            COPFIL
C           *****************************************
      SUBROUTINE LNLUN
C        load & list a specified unit from the files.
         CALL FETCH
         RETURN
C     END              LNLUN
C        *************************************************
      SUBROUTINE FETCH
C        obtain unit specified in INV(10) from each file
C        and load it into IAMAT array. IFI designates which
c        files will be read from.
         IFI=IFIL(2)
         IF(INV(13).EQ.3)THEN             @if FILE TRTMNT=3
            PRINT*, ' IS UNIT TO RE READ FROM SAME FILE? (1=YES)'
               READ*,IANS
               IF(IANS.NE.1)IFI=IFIL(1)
         ENDIF
40       DO 41 J=1,INV(15)
      READ(UNIT=(IFI+J),REC=INV(10),ERR=43)(IAMAT(L,J),L=1,MAXV(11))
41       CONTINUE
         RETURN
43         CALL FILERR(*40)
C     END              FETCH
C        *************************************************
      SUBROUTINE WINDOW
C        print the attribute array for each CI.
33       IF(INV(15).EQ.3)THEN
            WRITE(6,11) UNAME(INV(10)),(((IAMAT(I,J),I=K,K+4),
     Z            J=1,INV(15)),K=1,MAXV(11),5)
         ELSE
            IF(INV(15).EQ.2)THEN
               WRITE(6,12) UNAME(INV(10)),(((IAMAT(I,J),I=K,K+4),
     Z                     J=1,INV(15)),K=1,MAXV(11),5)
            ELSE
               WRITE(6,13) UNAME(INV(10)),(IAMAT(I,1),I=1,MAXV(11))
            ENDIF
         ENDIF
11    FORMAT(/,1X,A8,4I4,I5,4I4,I5,4I4,I5,/,(9X,4I4,I5,4I4,I5,4I4,I5))
12    FORMAT(/,1X,A8,3X,5I5,3X,5I5,/,(12X,5I5,3X,5I5))
13    FORMAT(/,1X,A8,3X,5I5,/,(12X,5I5,3X))
         RETURN
C     END              WINDOW
C        ***********************************************
      SUBROUTINE BRANCH
C        Branch to operation as specified by user.
         GOTO(61,62,63,64,65)INV(6)
C
61       CALL EDDEM                @enter changes
         RETURN
62       CALL COPYUN(*69)           @copy sequence
         RETURN
63       CALL PRNTFL(*69)           @print from files
         RETURN
64       CALL ROWCH            @change by individual row
         RETURN
65       CALL NEWFLS           @enter changes into new files
69       RETURN
C     END              BRANCH
```

```
      SUBROUTINE PRNTFL(*)
C         Print data from files regarding units listed.
         PRINT*, ' PRINT LOCALLY OR AT DPFO? (1=LOCAL)'
            READ*, IANS
            IF(IANS.EQ.1)THEN
               DO 74 IJ=INV(8),INV(9)  @unit nos. specified
                  INV(10)=IJ
                  CALL LNLUN
74             CONTINUE
         RETURN 1
         ELSE
            DO 76 I=1,INV(15)
              DO 78 J=1,MAXV(8)
                 READ((IFIL(2)+I),REC=J) (IAMAT(K,I),K=1,MAXV(11))
      WRITE((IFIL(3)+I),1113) J,UNAME(J),(IAMAT(K,I),K=1,MAXV(11))
1113        FORMAT(/,2X,I2,'.',2X,A8,3X,5I5,/,(18X,5I5))
78            CONTINUE
76          CONTINUE
         ENDIF
         RETURN 1
C     END            PRNTFL
C        **************************************************
      SUBROUTINE EDDEM
C        Enter changes. All options in CHNGS available.
         CALL ININD(3,9)
         CALL STATIS(1,MAXV(10))
623      CALL INIT
         CALL FETCH          @change to LNLUN for file check
625      CALL CHANGD
         CALL NXTWPN(*625)
         CALL WINDOW              @chk contents of array
         CALL PLIST
         CALL SAVAR(INV(10))
         CALL NXTUNT(*623)
         RETURN
C     END            EDDEM
C        **************************************************
      SUBROUTINE COPYUN(*)
C        Copy one sequence of units into another. Options
C        incl new demand, save and list. Current units (in
C        INV(8 & 9)) are copied into the unit no. in INV(12)
C        (INV(11) holds 1st new unit). When complete, the
C        copied units are set to current status.
         CALL ININD(1,10)
         IND(8)=1
         CALL STATIS(9,11)
         CALL INIT
         INV(10)=INV(8)
888      PRINT*, ' ENTER FIRST UNIT NO. TO BE COPIED INTO. '
            READ*, INV(11)
            CALL VERIFY(INV(11),MAXV(8),*899)
            INV(12)=INV(11)
            DO 899 ICUR=INV(8),INV(9)
               INV(10)=ICUR
            CALL DUPE(INV(12))
            INV(12)=INV(12)+1
899       CONTINUE
          INV(8)=INV(11)
          INV(9)=INV(12)-1
          INV(10)=INV(9)
        RETURN 1
C     END             COPYUN
C       ***********************************************
      SUBROUTINE NEWFLS
C       Enter changes into newly created files. All options
C       available except 'locate by ammo code.'
        CALL ININD(5,9)
        CALL STATIS(1,11)
802     CALL INIT
        CALL FETCH
801     CALL CHANGD
        CALL NXTWPN(*801)
        CALL WINDOW             @chk contents of array
        CALL PLIST
        CALL SAVAR(INV(10))
        CALL NXTUNT(*802)
        RETURN
C     END             NEWFLS
C       ***********************************************
      SUBROUTINE ININD(J,K)
C       Initialize the status indicator. Default value is 1.
C       Status 0 determined by calling routine (J,K=limits).
        DO 610 I=1,(MAXV(10)-1)
          IND(I)=1
 610    CONTINUE
        DO 620 I=J,K
          IND(I)=0
620     CONTINUE
        IND(MAXV(10))=0
        RETURN
C     END             ININD
C       ******************************************
      SUBROUTINE STATIS(LL,KK)
C       Display options valid for the calling routine and
C       their value (1 = do change, 0 = don't). ICH = 1 if
C       status is altered. LL-KK = options to be displayed.
        LEAP=5
        ICH=0
70    PRINT*, ' STATUS OF OPTIONS: (1=CHANGE, 0=STAY SAME)'
        WRITE(6,1117) (I, CHNGS(I), IND(I),I=LL,KK)
1117      FORMAT(/,3(2X,I3,'. ',A10,' = ',I1))
C
      PRINT*, ' TO ALTER STATUS, ENTER ITEM NO.(0=NONE;INFO=99)'
71      READ*, IANS
         IF(IANS.EQ.0)THEN
          IF(ICH.GT.3)WRITE(6,1117)(I,CHNGS(I),IND(I),I=LL,KK)
          RETURN
         ENDIF
```

```
          CALL VERIFY(IANS,KK,*71)
          IF(IND(IANS).EQ.0)THEN
            IND(IANS)=1
          ELSE
            IND(IANS)=0
          ENDIF
          ICH=ICH+1                       @set alter indicator
      GOTO 71
C     END           STATIS
C        ********************************************
      SUBROUTINE INIT
C           Initialize variables.
         DO 110 I=1,INV(15)
            DO 120 J=1,6
               MNT(J,I)=0
               KMB(J,I)=0
               RNDS(J,I)=0.0
120         CONTINUE
            RNDT(I)=0.0
            DO 122 J=1,MAXV(11)
              IAMAT(J,I)=0
122         CONTINUE
110      CONTINUE
         DO 124 I=1,6
            DO 123 J=1,6
               IWPV(I,J)=0
123         CONTINUE
            WPN(I)='          '
            AMON(I)='          '
124      CONTINUE
         RETS=0.0
         KCOL=1
         KROW=1
         INV(5)=0
         RETURN
C     END           INIT
C        **********************************************
      SUBROUTINE CHANGD
C        User enters options as indicated by CHNGS status.
C              **********
C        Locate specific ammo code. Need not be in order.
75       LEAP=10
         IF(IND(12).NE.1)GOTO 73
         PRINT*, ' ENTER AMMO CODE: (INFO=99)'
            READ*, INV(14)
               IF(INV(14).EQ.99)CALL INFO(LEAP,*75)
               KROW=1
74             KCOL=5*KROW-4
               IF(IAMAT(KCOL,1).EQ.INV(14))GOTO 73
               KROW=KROW+1
               IF(KROW.LE.6)GOTO 74
               PRINT*, ' AMMO CODE NOT FOUND. TRY AGAIN.'
            GOTO 75
C              **********
```

```
1175     FORMAT(/,10X,'FOR WPN NO. ',I2,' OF UNIT ',I3,
     z         ' ENTER THE FOLLOWING:')
C           Determine the weapon system number.
         LAP=1    @offset for NUWPN routine
         IF(IND(3).EQ.1)CALL NUWPN(LAP,*37,*750)
         CALL CURWPN(*750)
C              **********
C        Determine the total no of weapons alive. For
c        information, user enters 99 as 1st entry and
c        any integer(s) for the other(s). To zero out
c        the rest of the array for the entire phase,
c        user enters 9999 as first input. . .etc.
37    IF(IND(1).EQ.1)THEN
         LEAP=11
      PRINT*, ' NO. OF WPNS ALIVE PER CI: (NONE=0;INFO=99 . .)'
         READ*, (IAMAT(KCOL+1,I),I=1,INV(15))
         IF(IAMAT(KCOL+1,1).EQ.99)CALL INFO(LEAP,*37)
         IF(IAMAT(KCOL+1,1).EQ.9999)THEN
            KROW=6          @set row indx to last row
            DO 371 I=1,INV(15)
               DO 372 J=KCOL,30,5
                  DO 378 K=1,4
                     IAMAT(J+K,I)=0
378               CONTINUE
372            CONTINUE
371         CONTINUE
            RETURN
         ENDIF
      ENDIF
C              **********
C        Determine total no of wpns firing (short of ammo).
      IF(IND(2).EQ.1)THEN
C        (Artillery receive ammo differently.)
         IF(IWPV(KROW,1).GT.7.AND.IWPV(KROW,1).LT.11)THEN
            PRINT*, ' NO. OF WPNS RECEIVING AMMO PER CI:'
         ELSE
         PRINT*, ' NO. OF WPNS SHORT PER CI: (0=NONE)'
         ENDIF
            READ*, (IAMAT(KCOL+2,I),I=1,INV(15))
      ENDIF
C        Verify wpns alive greater than/equal wpns short.
C        For artillery, test does not apply.
         IF(IWPV(KROW,1).GT.10.OR.IWPV(KROW,1).LT.8)THEN
            IANS=0
            DO 370 I=1,INV(15)
               IF(IAMAT(KCOL+2,I).GT.IAMAT(KCOL+1,I))IANS=-1
370         CONTINUE
            CALL VERIFY(IANS,0,*37)
         ENDIF
C              **********
C        Enter the no. of maintenance returns.
      IF(IND(5).EQ.1)THEN
      PRINT*, ' NO. OF MAINTENANCE RETURNS PER CI: (0=NONE)'
            READ*, (MNT(KROW,I), I=1,INV(15))
```

```
                  INV(5)=4       @set indicator for returns
          ENDIF
C                ##########
C            Enter the no. of combat reserves.
          IF(IND(6).EQ.1)THEN
            PRINT*, ' NO. OF COMBAT RESERVES PER CI: (0=NONE)'
              READ*, (KMB(KROW,I),I=1,INV(15))
                IF(IND(11).NE.1.AND.IND(7).NE.1)CALL OLDEM
                  INV(5)=4       @set indicator for returns
          ENDIF
C                ##########
C            Enter the no. of attack helicopters per cell.
          IF(IND(4).EQ.1.AND.(IWPV(KROW,1).EQ.12.OR.IWPV(KROW,1).EQ.13))THEN
            PRINT*, ' NO. OF ATK HELIS/CELL PER CI: (0=NONE)'
              READ*, (IAMAT(KCOL+3,I),I=1,INV(15))
          ENDIF
C                ##########
C            Enter a preselected demand.
            IF(IND(7).EQ.1)THEN
            PRINT*, ' PRESELECTED DEMAND PER CI: (INTEGER ONLY)'
              READ*, (IAMAT(KCOL+4,I),I=1,INV(15))
            ENDIF
C           Data for howitzers is duplicated for each ammo type.
            IF(IWPV(1,1).EQ.8.OR.IWPV(1,1).EQ.9)THEN
              MX=4          @# of add. ammo types for 155 how
              IF(IWPV(1,1).EQ.8)MX=2  @for 8"
              DO 374 J=1,INV(15)
                DO 376 I=5,5*MX,5
                  IAMAT(I+2,J)=IAMAT(2,J)
                  IAMAT(I+3,J)=IAMAT(3,J)
                  IF(IND(7).EQ.1)IAMAT(I+5,J)=IAMAT(5,J)
 376            CONTINUE
                DO 377 K=2,MX+1
                  MNT(K,J)=MNT(1,J)
                  KMB(K,J)=KMB(1,J)
377             CONTINUE
374           CONTINUE
            ENDIF
C             ##########
C           generate new demand.
            IF(IND(11).EQ.1)CALL DEMAND
750       RETURN
C         END            CHANGD
C
C             ########################################
          SUBROUTINE DEMAND
C           Demand factors (MOPP, Battle Intens, Phase, New Rqts)
C           are polled for each unit. Ammo and wpn types entered
C           if necessary. Expenditure rates difference calculated
C           and verified. New demand generated.
            IF(KROW.EQ.1.OR.IND(12).EQ.1)THEN
              CALL DEFACT          @if 1st wpn, check DMD FACTORS
            ELSE                   @check if new wpn rqts needed
              IF(INV(5).NE.0.AND.INV(5).NE.4)CALL CHKRET
```

```
        CALL CURWPN(*375)           @obtain current wpn type
      IF(IWPV(KROW,1).EQ.14)THEN    @new wpn type
        PRINT*, ' ENTER NAME OF NEW WPN SYSTEM.'
          READ*, WPN(KROW)
      ELSE
        WPN(KROW)=WPSYS(IWPV(KROW,1))
      ENDIF
373   IF(INV(3).EQ.8)THEN             @new ammo type
        PRINT*, 'ENTER NAME OF AMMO TYPE'
          READ*, AMON(KROW)
        PRINT*, ' ENTER HIGH AND LOW EXPENDITURE RATES.'
        READ*, IWPV(KROW,2),IWPV(KROW,3)
      ELSE                            @ammo expenditure rates
        IWPV(KROW,2)=MAXAR(IWPV(KROW,1),INV(3))
        IWPV(KROW,3)=MINAR(IWPV(KROW,1),INV(3))
      ENDIF
C
        CALL VERIFY(IWPV(KROW,3),IWPV(KROW,2),*373)
        IWPV(KROW,6)=IWPV(KROW,2)-IWPV(KROW,3)
C           ***********
C           demand calculations
C       A random no. is generated and multiplied by the
C       expenditure rate diff., the lower limit is added,
C       and the result rounded and saved as 'day's draw.'
C       The phase period draw, equals a proportion of the
C       total (.6=day;.4=night) * MOPP. The CI draw equals
C       a proportion of phase total. For helicopters, phase
C       total = day total. A new draw is made for each CI.
      IF(IWPV(KROW,1).EQ.12.OR.IWPV(KROW,1).EQ.13)THEN
        IWPV(KROW,4)=0
        DO 48 I=1,INV(15)
47        DRAW=RANF(DUM)
          DRAW=DRAW*IWPV(KROW,6)+IWPV(KROW,3)
          IF(NINT(DRAW).LT.IWPV(KROW,3))GOTO 47
          RNDS(KROW,I)=NINT(DRAW)
          IWPV(KROW,4)=IWPV(KROW,4)+RNDS(KROW,I)
          RNDT(I)=RNDS(KROW,I)*IAMAT(KCOL+2,I)   @tot rnds
48      CONTINUE .
        IWPV(KROW,5)=IWPV(KROW,4)     @phse draw=tot draw
      ELSE
44      DRAW=RANF(DUM)
        DRAW=DRAW*IWPV(KROW,6)+IWPV(KROW,3)
        IF(NINT(DRAW).LT.IWPV(KROW,3))GOTO 44
        IWPV(KROW,4)=NINT(DRAW)
        IF(INV(4).EQ.1)THEN
          DRAW=DRAW*0.6*INV(2)/100.          @day draw
        ELSE
          DRAW=DRAW*0.4*INV(2)/100.          @night draw
        ENDIF
        IWPV(KROW,5)=NINT(DRAW)      @phase draw saved
C             **********
c       Determine cumulative rounds per wpn per CI.
46      CUM=0.0
        DO 42 I=1,INV(15)
```

```
               CUM=CUM+RNDS(KROW,I)
42          CONTINUE
            JST=0
            DO 43 J=1,INV(15)
               RNDS(KROW,J)=NINT(RNDS(KROW,J)/CUM*DRAW)
               IF(RNDS(KROW,J).LT.1.0)RNDS(KROW,J)=1.0
c           Test for divad (a rnd = 90 bursts).
               IF(IWPV(KROW,1).EQ.11)THEN
                  RNDS(KROW,J)=NINT(RNDS(KROW,J)/90.0)
                  IF(RNDS(KROW,J).LT.1.0)RNDS(KROW,J)=1.0
                  RNDS(KROW,J)=RNDS(KROW,J)*90
               ENDIF
C           Tests for howitzers.
              IF(IWPV(KROW,1).EQ.9.AND.RNDS(KROW,J).GT.(600./INV(15)))JST=1
              IF(IWPV(KROW,1).EQ.8.AND.RNDS(KROW,J).GT.(300./INV(15)))JST=1
C           Total rounds = rnds*wpns short.
               RNDT(J)=RNDS(KROW,J)*IAMAT(KCOL+2,J)   @tot rnds
43          CONTINUE
            IF(JST.NE.0)GOTO 46
         ENDIF
C                 **********
C        Incorporate mnt returns & cmb reserves into tot rnds.
C        Calculate howitzer rounds for each ammo type.
C
         DO 45 I=1,INV(15)
            IF(IWPV(1,1).EQ.9)THEN                  @155 howitzers
               DO 451 J=1,5
                  RETS=KMB(J,I)+MNT(J,I)/2.
               IF(INV(10).LT.12)THEN
                  IAMAT(J*5,I)=NINT(PER(J)*RNDT(I)+(IHOWL(J)*RETS))
               ELSE
                  IAMAT(J*5,I)=NINT(PER(J)*RNDT(I)+(IHOWL(J+5)*RETS))
               ENDIF
               RNDS(J,I)=RNDS(1,I)         @dupe rnds/wpn
451            CONTINUE
            ELSE
               IF(IWPV(1,1).EQ.8)THEN           @8-inch howitzers
               DO 452 J=1,3
                  RETS=MNT(J,I)/2.+KMB(J,I)
                  IAMAT(J*5,I)=NINT(PER(J+5)*RNDT(I)+IHOWL(J+10)*RETS)
                  RNDS(J,I)=RNDS(1,I)        @dupe rnds/wpn
452            CONTINUE
               ELSE
                  RETS=KMB(KROW,I)+MNT(KROW,I)/2.
                  IAMAT(KCOL+4,I)=NINT(RNDT(I)+LOAD(IWPV(KROW,1))*RETS)
               ENDIF
            ENDIF
45       CONTINUE
375         RETURN
C        END           DEMAND
C              ****************************************
         SUBROUTINE NXTWPN(*)
C           Determine if another wpn in unit is to be changed.
C           . . .All artillary have only one 'wpn' entered.
```

```
         IF(KROW.GE.6)RETURN                @last row in array
         KROW=KROW+1
         KCOL=5*KROW-4
C        Automatically go to next wpn unless inputting changes.
      IF((IND(8).EQ.2).OR.(INV(6).NE.1.AND.INV(6).NE.5))RETURN 1
         IF(INV(7).EQ.2)THEN
            PRINT*, ' ANOTHER WPN SYSTEM FOR UNIT? (0-NO)'
         ELSE
C        999 used only to escape sequential entry method.
      PRINT*, 'ANOTHER WPN FOR THIS UNIT? (0=NO;999=EXIT SEQ)'
         ENDIF
            READ*, IANS                  ?poll if entering changes.
            IF(IANS.EQ.999)THEN
               IANS=0
            INV(9)=INV(10)
            ENDIF
            IF(IANS.EQ.0)RETURN
         RETURN 1
C     END             NXTWPN
C           ****************************************
      SUBROUTINE PLIST
C        Print a listing of the inputs and factors pertaining
C        to the current unit onto the screen/local printer.
         IF(IND(9).EQ.1)GOTO 50
         PRINT*, ' LIST THE UNIT STATS? (1=YES)'
            READ*, IANS
               IF(IANS.NE.1)RETURN
50       WRITE(6,1500)
            IF(INV(4).EQ.8)THEN
         WRITE(6,1503) INV(10),UNAME(INV(10)),DRN(INV(4)),(WPN(I),
     z                (IWPV(I,J),J=1,5),AMON(I),I=1,6)
            ELSE
               IF(IWPV(1,1).EQ.9.OR.IWPV(1,1).EQ.8)THEN
         WRITE(6,1506) INV(10),UNAME(INV(10)),DRN(INV(4)),WPN(1),
     z                (IWPV(1,J),J=1,5)
         WRITE(6,1508)
         WRITE(6,1507) ((IAMAT(I,J),I=5,25,5),J=1,INV(15))
               ELSE
         WRITE(6,1505) INV(10),UNAME(INV(10)),DRN(INV(4)),(WPN(I),
     z                (IWPV(1,J),J=1,5),I=1,6)
               ENDIF
            ENDIF
         WRITE(6,1501)
            DO 505 L=1,INV(15)
         WRITE(6,1504) NOCI(L),((IAMAT(5*I-J,L),J=4,1,-1),MNT(I,L),
     z                KMB(I,L),RNDS(I,L),IAMAT(5*I,L),I=1,6)
505         CONTINUE
         RETURN
1500  FORMAT(/,5X,'UNIT',5X,'PHASE  WEAPON SYSTEM  AMMO EXPENDITURE-',
     z      'DEMAND  (NEW AMMO)',/,21X,'NAME',7X,'NO  ( LIMITS )',
     z      '  DRAW /PHASE')
1501  FORMAT(/,9X,'CI  AMMO',4X,'WEAPONS',4X,'AHS/  RETURNS  ROUNDS ',
     z      'SPENT',/,9X,'NO  CODE  ALIVE SHORT  CELL  MNT CMB',
     z      '  /TUBE  TOTAL')
```

```
1503  FORMAT(/,1X,I2,2X,A8,1X,A5,2X,A10,I3,I6,I5,2I7,2X,A10,/,(21X,
     z       A10,I3,I6,I5,2I7,2X,A10))
1505  FORMAT(/,1X,I2,2X,A8,1X,A5,2X,A10,I3,I6,I5,2I7,/,(21X,
     z       A10,I3,I6,I5,2I7))
C
1504  FORMAT(/,9X,I2,I6,I7,2I6,I5,I4,1X,F6.1,I7,/,(11X,I6,I7,2I6,I5,
     z            I4,1X,F6.1,I7))
1506  FORMAT(/,1X,I2,2X,A8,1X,A5,2X,A10,I3,I6,I5,2I7)
1507  FORMAT(/,30X,4I6,I5)
1508  FORMAT(/,31X,'HOWITZER DEMAND BY AMMO TYPE',/,33X,
     z       'HE   ICM   RAP   CLGP ETC.')
C     END            PLIST
C        ***************************************
      SUBROUTINE SAVAR(N)
C        Save unit attributes (IAMAT array) in record ind.
C        by N (= unit no). If auto save not specified in
C        STATUS, user is polled.
         IF(IND(10).EQ.1)GOTO 501
         PRINT*, ' SAVE? (1=YES)'
            READ*, IANS
               IF(IANS.NE.1)RETURN
C        Howitzers: wpns alive copied into wpns short.
501      IF(IWPV(1,1).EQ.8.OR.IWPV(1,1).EQ.9)THEN
            DO 502 I=1,INV(15)
               DO 503 J=2,27,5
                  IAMAT(J+1,I)=IAMAT(J,I)
503            CONTINUE
502         CONTINUE
         ELSE       @If divad, set wpns sht=wpns alive
         DO 504 I=1,INV(15)
            DO 506 J=1,6
             IF(IWPV(1,1).EQ.10)IAMAT(5*J-2,I)=IAMAT(5*J-3,I)
506         CONTINUE
504      CONTINUE
         ENDIF
777      DO 778 I=1,INV(15)
         WRITE(UNIT=(IFIL(2)+I),REC=N,ERR=779) (IAMAT(J,I),J=1,MAXV(11))
778      CONTINUE
         RETURN
779      CALL FILERR(*777)
C     END            SAVAR
C        *******************************************
      SUBROUTINE NXTUNT(*)
C        See if the unit just modified is to be copied,
C        and if it is < the max in sequence. Increment
C        current unit no and copy sequentially if INV(7)=3.
         IF(IND(8).EQ.1.AND.INV(7).NE.3)CALL DITTO
         IF(INV(10).GE.INV(9).AND.INV(7).NE.3)RETURN
         INV(10)=INV(10)+1
         IF(INV(7).NE.3)RETURN 1
         DO 939 JK=INV(10),INV(9)
            INV(10)=JK
            CALL DUPE(INV(10))
939      CONTINUE
```

AD-A131 218 AMMUNITION RESUPPLY MODEL VOLUME 2 PROGRAMMER'S MANUAL 3/3
(U) COMBINED ARMS OPERATIONS RESEARCH ACTIVITY FORT
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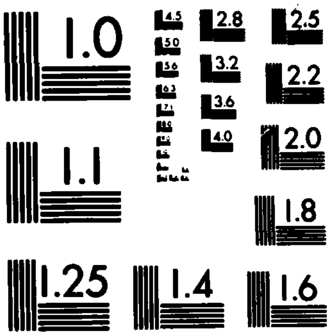

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
C     END            NXTUNT
C        **************************************************
      FUNCTION NXTSTP(dum)
C        Return value of the next operation desired by user.
900      LEAP=7
         dum=0
         PRINT*, ' WHAT NEXT? (INFO=0)'
         PRINT*, ' 1=CONTINUE METHOD          2=CHANGE METHOD'
         PRINT*, ' 3=COPY UNITS               4=NEW RUN'
         PRINT*, ' 5=PRINT MODIFIED FILE      6=END'
            READ*, IANS
            IF(IANS.EQ.0)CALL INFO(LEAP,*900)
         CALL VERIFY(IANS,6,*900)
         NXTSTP=IANS
C        RETURN
C        END FUNCTION
C        **********************************************
      SUBROUTINE NUCI(*)
C        Start a new run.
      PRINT*, ' CAUTION. ROUTINE ONLY WORKS IF ADDITIONAL'
      PRINT*, ' UNITS WERE ASSIGNED IN THE SRG RUNSTREAM.'
         READ*, IANS
            IF(IANS.NE.1)RETURN 1
         DO 400 I=1,INV(15)
            CLOSE ((IFIL(1)+I))
            CLOSE ((IFIL(2)+I))
400      CONTINUE
         CALL INIT
         IFIL(1)=IFIL(1)+9
         IFIL(2)=IFIL(2)+9
         IFIL(3)=IFIL(3)+9
         RETURN 1
C
C     END         NUCI
C        ********************************************
      SUBROUTINE ROWCH
C        Enter changes to each column of row specified in CI
C        specified (1,2,3). Rows may be given in any order.
C        IROW: changes; JR: CI and row nos; LP: index
      DIMENSION IROW(18,5),JR(18,2)
      DATA IROW/90*0/, JR/36*0/
C
         CALL ININD(1,MAXV(10))
         CALL STATIS(8,10)
         CALL INIT
         LEAP=12
660      LP=0
         CALL LNLUN
665      LP=LP+1
661   PRINT*, ' ENTER CI (1-3) AND ROW (1-6). (INFO=0,0)'
         READ*, (JR(LP,I),I=1,2)
         IF(JR(LP,1).EQ.0.OR.JR(LP,2).EQ.0)CALL INFO(LEAP,*661)
            CALL VERIFY(JR(LP,1),INV(15),*661)
            CALL VERIFY(JR(LP,2),6,*661)
```

```
               READ*, (IROW(LP,I),I=1,5)
            IF(LP.LT.13)THEN
               PRINT*, ' ANOTHER CHANGE FOR THIS UNIT? (1=YES)'
                  READ*, IANS
                  IF(IANS.EQ.1)GOTO 665
            ENDIF
667         DO 668 K=1,LP
               I=JR(K,1)                            @CI no.(1,2,3)
               J=5*JR(K,2)-5                        @row offset
               DO 664 L=1,5
                  IAMAT(J+L,I)=IROW(K,L)
664            CONTINUE
668         CONTINUE
         CALL WINDOW
         CALL SAVAR(INV(10))
         IF(INV(7).EQ.2)THEN
            PRINT*, 'ANOTHER UNIT? (NO=0; YES=NEW UNIT NO.)'
               READ*, IANS
                  IF(IANS.EQ.0)RETURN
               INV(10)=IANS
               IF(IND(8).EQ.1)GOTO 667
               GOTO 660
         ELSE
            IF(INV(10 .GE.INV(9))RETURN
            INV(10)=INV(10)+1
            IF(INV(7).EQ.1)GOTO 660
            IF(INV(7).EQ.3)GOTO 667
         ENDIF
         RETURN
C     END            ROWCH
C        ********************************************
      SUBROUTINE DEFACT
C        Factors not saved in the files which affect demand
C        are listed. Changes are made by entering the factor
C        no. and its new value. Note: MOPP value is integer
C        and equals 100 times the real MOPP FACTOR.
C        LEAP: for use with info routine; IANS: var to be
C        changed; IANS+1: the index holding the new value.
C
15    PRINT*, 'CURRENT DEMAND FACTORS ARE:'
         WRITE(6,1515) (INV(I),I=2,5)
1515  FORMAT(/,1X,'1. MOPP = ',I3,'  2. INTENSITY = ',I1,
     z     '  3. PHASE = ',I1,'  4. NEW RETS = ',I3,/)
      LEAP=2
      PRINT*, ' ENTER FACTOR AND NEW VALUE. (NONE=0,0;INFO=0,FACTOR)'
20          READ*, IANS, INV(IANS+1)
               CALL VERIFY(IANS,4,*20)
               IANS = IANS+1
            IF(IANS.EQ.1)GOTO 25
               CALL VERIFY(INV(IANS),MAXV(IANS),*15)
               IF(IANS.EQ.3.OR.IANS.EQ.4)THEN     @must exclude 0
                  CALL VERIFY((INV(IANS)-1),MAXV(IANS),*15)
               ENDIF
            GOTO 20
         IF(INV(3).NE.0.AND.INV(5).NE.4)CALL CHKRET    @rets
         RETURN
C     END          DEFACT
C           ***********************************
      SUBROUTINE CHKRET
C        Enter new mnt/combat rets for wpn.
         IF(INV(5).GT.1)THEN          @new mnt returns
            PRINT*, ' ENTER MNT RETURNS FOR EACH CI.'
            READ*, (MNT(KROW,I),I=1,INV(15))
         ENDIF
C
         IF(INV(5).EQ.1.OR.INV(5).EQ.3)THEN
            PRINT*, ' ENTER COMBAT RESERVES FOR EACH CI.'
            READ*, (KMB(KROW,I),I=1,INV(15))
         ENDIF
         IF(IWPV(1,1).NE.8.AND.IWPV(1,1).NE.9)RETURN
            MX=5
            IF(IWPV(1,1).EQ.8)MX=3
            DO 414 I=1,INV(15)
               DO 415 J=2,MX
                  MNT(J,I)=MNT(1,I)
                  KMB(J,I)=KMB(1,I)
415            CONTINUE
414         CONTINUE
         RETURN
C     END          CHKRET
C        ************************************
      SUBROUTINE OLDEM
c     If returns have been entered but no demand generated,
c     return loads calculated and added to old demand.
         DO 82 I=1,INV(15)
            IF(IWPV(KROW,1).EQ.9)THEN
               DO 822 J=1,5
                  RETS=KMB(J,I)+(MNT(J,I)/2.)
                  IF(INV(10).LT.42)THEN
                     IAMAT(J*5,I)=NINT(IAMAT(J*5,I)+(IHOWL(J)*RETS))
                  ELSE
                     IAMAT(J*5,I)=NINT(IAMAT(J*5,I)+(IHOWL(J+5)*RETS))
                  ENDIF
822            CONTINUE
            ELSE
               IF(IWPV(KROW,1).EQ.8)THEN
                  DO 823 J=1,3
                  RETS=KMB(J,I)+(MNT(J,I)/2.)
                     IAMAT(J*5,I)=NINT(IAMAT(J*5,I)+(IHOWL(J+10)*RETS))
823               CONTINUE
               ELSE
                  RETS=KMB(KROW,I)+(MNT(KROW,I)/2.)
         IAMAT(KCOL+4,I)=NINT(IAMAT(KCOL+4,I)+(LOAD(IWPV(KROW,1))*RETS))
               ENDIF
            ENDIF
82       CONTINUE
         RETURN
C     END SUB OLDEM
```

```
      SUBROUTINE CURWPN(*)
C        Obtain current weapon system from file.
         IWPV(KROW,1)=0
         IF(IAMAT(KCOL,1).NE.0)GOTO 38
         PRINT*, ' NO WPN TYPE LISTED. ENTER WPN CODE WANTED'
         PRINT*, ' OR GO TO NEXT WPN. (0=NEXT WPN;INFO=99)'
            READ*, IWPV(KROW,1)
            IF(IWPV(KROW,1).EQ.0)RETURN 1
            LAP=2          @offset for NUWPN routine
            GOTO 387
38       IWPV(KROW,1)=IWPV(KROW,1)+1
         IF(IAMAT(KCOL,1).EQ.KWPSYS(IWPV(KROW,1)))RETURN
         IF(IWPV(KROW,1).LT.MAXV(9))GOTO 38
         CALL ERRWPN(*388)          @no match found
387      CALL NUWPN(LAP,*388,*389)      @to enter new wpn type
388      RETURN
389      RETURN 1
C     END SUB CURWPN
C        *******************************
      SUBROUTINE NUWPN(LIP,*,*)
C        Enter weapon system and assign proper ammo code to
C        array. Howitzers automatically enter all ammo codes.
C        LIP = offset to determine start of routine.
      LEAP=4
      GOTO(36,361)LIP
36    PRINT*, ' THE WPN SYSTEM NUMBER IS: (INFO=99)'
         READ*, IWPV(KROW,1)
361        IF(IWPV(KROW,1).EQ.99)CALL INFO(LEAP,*36)
            IF(IWPV(KROW,1).NE.0)GOTO 360
               DO 606 I=1,INV(15)
                  DO 607 J=KCOL,KCOL+4
                     IAMAT(J,I)=0
607               CONTINUE
606            CONTINUE
               RETURN 2
360         CALL VERIFY(IWPV(KROW,1),MAXV(9),*36)
            IF(IWPV(KROW,1).EQ.14)THEN
               PRINT*, ' ENTER NEW AMMO CODE NO.'
               READ*, IANS
                  DO 14 I=1,INV(15)
                     IAMAT(KCOL,I)=IANS
14                CONTINUE
               RETURN 1
               ENDIF
               DO 16 I=1,INV(15)
                  IAMAT(KCOL,I)=KWPSYS(IWPV(KROW,1))
                  IF(IWPV(1,1).EQ.9)THEN   @howitzers
                     DO 161 J=1,4
                        IAMAT((5*J+1),I)=KHW(J)
161                  CONTINUE
                  ENDIF
                  IF(IWPV(1,1).EQ.8)THEN
                     DO 162 J=1,2
                        IAMAT((5*J+1),I)=KHW(J+4)
                  ENDIF
16             CONTINUE
         RETURN 1
C     END SUB NUWPN
C           *******************************************
      SUBROUTINE COPYWP(NU,LRO,*)
C        Only the weapon whose ammo code is specified is
C        copied into the new unit. If demand is generated
C        for howitzers, it will be for all ammo types.
      DIMENSION KOPY(5,3)
      DATA KOPY/15*0/
         KOL=5*LRO-5
         DO 830 I=1,INV(15)
            DO 831 J=1,5
               KOPY(J,I)=IAMAT(KOL+J,I)
831         CONTINUE
830      CONTINUE
         INV(10)=NU                @new unit no.
         KROW=1
832      KCOL=5*KROW-4
            IF(IAMAT(KCOL,1).EQ.INV(14))GOTO 834
               KROW=KROW+1
               IF(KROW.LE.6)GOTO 832
                  PRINT*, 'AMMO TYPE NOT FOUND.'
                  RETURN 1
834      LRO=KROW
            DO 836 I=1,INV(15)
               DO 837 J=1,5
                  IAMAT(KCOL+J,I)=KOPY(J,I)
837            CONTINUE
836         CONTINUE
         IF(IND(11).NE.1)RETURN 1
         IF(IAMAT(1,1).EQ.4.OR.IAMAT(1,1).EQ.6)THEN
            KROW=1
            KCOL=1
         ENDIF
         CALL DEMAND
         KCOL=5*LRO-4
         RETURN 1
C     END          COPYWP
C        ********************************************
      SUBROUTINE DUPE(N)
C        Data for one unit is duplicated into another unit.
C        New demand is generated if indicated. List and
C        save are polled. N=unit (record) number of copy.
            IF(IND(12).EQ.1)CALL COPYWP(N,KROW,*934)
            KROW=1           @move ptrs to start of array
            KCOL=1
            IF(IND(11).EQ.1)THEN
933            CALL DEMAND
               IND(8)=2                @avoid nxtwpn poll
               CALL NXTWPN(*933)
               IND(8)=1                @reset copy indicator
            ENDIF
            CALL SAVAR(N)
         RETURN
C     END             DUPE
C        ************************************************
      SUBROUTINE DITTO
C        Copy one unit into many non-sequential locations.
930      PRINT*, ' ENTER NEW UNIT NO. (0=NONE)'
            READ*, IUNS
               IF(IUNS.EQ.0)RETURN
               CALL VERIFY(IUNS,MAXV(8),*930)
               CALL DUPE(IUNS)
            GOTO 930
C     END             DITTO
C        ********************************************
      SUBROUTINE ZOT
C        Set attribute array to 0.
         DO 81 I=1,INV(15)
            DO 82 J=1,MAXV(11)
               IAMAT(J,I)=0
82          CONTINUE
81       CONTINUE
         RETURN
C     END             ZOT
C           ****************************************
      SUBROUTINE INFO(JMP,*)
C     print message at JMP offset and return to * location.
C
      GOTO(255,250,256,257,258,261,259,263,264,266,267,268)JMP
C          LEAP=2: demand factors
250      CALL VERIFY(INV(1),3,*249)
         GOTO(251,252,253,254)INV(1)
C          MOPP
251   PRINT*, ' ENTER AN INTEGER EQUAL TO 100*MOPP FACTOR'
      PRINT*, ' IN THE RANGE FROM 0 AND 100.'
      RETURN 1
C          battle intensity
252   PRINT*, ' BATTLE INTENSITY CHOICES INCLUDE:'
      PRINT*, ' 1 = DEFEND,INTENSE      5 = DELAY,MBA-LIGHT'
      PRINT*, ' 2 = DEFEND,MODERATE     6 = DELAY, CFA'
      PRINT*, ' 3 = DEFEND,LIGHT        7 = ATTACK'
      PRINT*, ' 4 = DELAY,MBA-INTENSE   8 = SPECIFY AMMO RATES'
      RETURN 1
C          time of day
253   PRINT*, ' ENTER PHASE, DAY/NIGHT. (1 = day, 2 = night)'
      RETURN 1
C          additional wpn returns
254   PRINT*, ' 'MORE RETS' SHOWS IF COMBAT AND MNT RETURNS'
      PRINT*, ' HAVE BEEN ENTERED FOR THIS WPN: 0=NO; 4=YES.'
      PRINT*, ' TO ENTER NEW RETS, USER ENTERS A FIGURE:'
      PRINT*, ' 1=COMBAT RESERVES; 2=MNT RETURNS; 3=BOTH.'
         RETURN 1
C          LEAP=6: CI nos.
261   PRINT*, ' THE NO. OF CIS INVOLVED:   THE NO. WORKED'
      PRINT*, ' WITH (1-3)...THE NO. IN THE PHASE. THE'
      PRINT*, ' AND DO NOT AFFECT DATA FILES. ENTER 1 PER CI.'
      RETURN 1
C        LEAP=1: types of operations and methods available.
255   PRINT*, ' 'PRINT' PRINTS FILE DATA FOR UNITS SPECIFIED.'
      PRINT*, ' CAN LIST LOCALLY OR AT DFFO. NO CHANGES MADE.'
      PRINT*, ' 'EDIT' ACCEPTS NEW VALUES FROM USER. USER'
      PRINT*, ' SPECIFIES WHICH OPTIONS TO INCLUDE. DEMAND CAN '
      PRINT*, ' CAN BE GENERATED. IN 'COPY,' USER COPIES'
      PRINT*, ' ONE SEQUENCE OF UNITS INTO ANOTHER. OPTIONS'
      PRINT*, ' FOR PRINT, NEW DEMAND, SAVE ARE AVAILABLE.'
      PRINT*, ' 'BY ROW' PERMITS CHANGES ONLY ON INDIV. ROWS.'
      PRINT*, ' OF UNIT ARRAY. USER ENTERS ROW #, CI # (1,2,3)'
      PRINT*, ' AND VALUES FOR EACH OF THE 5 COLUMNS.'
264   PRINT*, ' 'RANDOM' ALLOWS USER TO WORK ON INDIV. UNITS.'
      PRINT*, ' 'SEQUENCE' PERMITS WORK ON UNITS IN SEQ. ORDER.'
      PRINT*, ' 1ST AND LAST UNIT NOS ARE ENTERED AND STATUS
      PRINT*, ' OPTIONS SET. EACH UNIT IS CALLED IN TURN. '
      PRINT*, ' SEQ. MAY BE INTERRUPTED BY ENTERING 999 IN'
      PRINT*, ' RESPONSE TO 'ANOTHER WPN FOR THIS UNIT?''
      PRINT*, ' 'GROUP' PERMITS ITEMS FOR ONE UNIT TO BE'
      PRINT*, ' DUPLICATED IN ALL UNITS OF THE GROUP.'
            RETURN 1
C           LEAP=3: unit nos. and names
256   PRINT*, ' UNIT NOS. RANGE FROM 1 TO ', MAXV(8), '. '
      PRINT*, ' DO YOU WANT A LISTING OF THE NAMES? (1=YES)'
         READ*, IANS
            IF(IANS.NE.1)RETURN 1
            WRITE(6,1256) (I,UNAME(I),I=1,MAXV(8))
1256            FORMAT(/,4(3X,I2,', ',A8))
      RETURN 1
C           LEAP = 4: weapon systems
257    PRINT*, ' WPN SYSTEM TYPES INCLUDE:'
         WRITE(6,1257) (I,WPSYS(I),I=1,MAXV(9)),0,'NONE      ',
1257           FORMAT(/,4(3X,I2,' = ',A10))
           RETURN 1
C           LEAP = 5: options & status
258   PRINT*, ' IF STATUS OF OPTION IS SET TO 1, THAT OPTION'
      PRINT*, ' WILL BE USED. IF SET TO 0, IT WONT BE USED.'
      PRINT*, ' FOR OPTS 1-6, IF THE STATUS=1, USER IS ASKED'
      PRINT*, ' TO ENTER CHANGES (USER MUST SUPPLY THE CORRECT'
      PRINT*, ' NO. OF RESPONSES TO EACH QUESTION. . .IF ASKED'
      PRINT*, ' FOR ENTRIES 'PER CI', ONE ANSWER FOR EACH CI'
      PRINT*, ' MUST BE GIVEN). IF STATUS=0, THE VALUE OF THE'
      PRINT*, ' OPTION WILL REMAIN THE SAME.  IF OPTION 7=1,'
      PRINT*, ' DEMAND CAN BE INSERTED. IF '8'-1, A UNIT CAN'
      PRINT*, ' BE COPIED INTO DIFFERENT LOCATIONS--ONE AT A'
      PRINT*, ' TIME. '9'=1 AUTOMATICALLY LISTS UNIT DATA;'
      PRINT*, ' '10'=1 AUTOMATICALLY SAVES THE DATA. IF 7=0,'
      PRINT*, ' OR 10=0, USER IS POLLED AFTER EACH UNIT. IF'
      PRINT*, ' 11=1, NEW DEMAND WILL BE GENERATED. IF 12=1,'
      PRINT*, ' USER INSERTS AN AMMO CODE TO MAKE INDIVIDUAL'
      PRINT*, ' WEAPON CHANGES. CODE MUST MATCH ONE IN ARRAY'
      PRINT*, ' AND CODES MAY BE GIVEN IN ANY ORDER.'
      PRINT*, ' NOTE: DIFFERENT ROUTINES PERMIT DIFF. OPTS.'
      PRINT*, ' TO ZERO OUT REMAINING UNIT FOR FULL PHASE,'
      PRINT*, ' USER SELECTS OPTION 1 (wpns alive) AND ENTERS'
      PRINT*, ' 9999 AS FIRST RESPONSE TO 'WPNS ALIVE.''
      RETURN 1
C          LEAP=7: next step
259   PRINT*, ' SELECT MANNER OF CONTINUATION: '1' REPEATS'
      PRINT*, ' SAME METHOD. UNIT NOS AND OPTION STATUS CAN BE'
      PRINT*, ' CHANGED. '2' PERMITS THE METHOD TO BE CHANGED.'
      PRINT*, ' '3' COPIES LAST SEQ OF UNITS. USER IS ASKED TO'
      PRINT*, ' ENTER THE FIRST UNIT NO. OF THE NEW SEQUENCE.'
      PRINT*, ''4' BEGINS A NEW RUN WITH DIFF CIS *IFF* EXTRA'
      PRINT*, ' FILES WERE ASSIGNED BY THE SSG RUNSTREAM.'
      PRINT*, ' '5' PRINTS FROM THE FILES--LAST SEQUENCE IS'
      PRINT*, ' LISTED LOCALLY OR ENTIRE FILE IS COPIED INTO'
      PRINT*, ' 'REPORT' TO BE SENT TO DPFO . '6' ENDS RUN.'
         RETURN 1
c           LEAP=8: file treatment
263   PRINT*, ' IN (1) A NEW FILE OR NEW CYCLE OF AN OLD FILE'
      PRINT*, ' IS AUTOMATICALLY COPIED FROM AN OLD ONE.'
      PRINT*, ' IN (2) A NEW FILE IS INITIALIZED TO ZERO.'
      PRINT*, ' IN (3) ONLY PART OF A FILE IS TO BE COPIED'
      PRINT*, ' INTO ANOTHER. USER WILL BE POLLED BEFORE EACH'
      PRINT*, ' FETCH TO DETERMINE WHICH FILE IS TO BE READ.'
         RETURN 1
C           LEAP = 10: ammo codes
266   PRINT*, ' AMMO CODES MUST MATCH AN ITEM IN THE 1ST COL'
      PRINT*, ' IN THE ARRAY SHOWN. POSSIBLE VALUES INCLUDE:'
         WRITE(6,1266) (KWPSYS(I),I=1,13)
1266  FORMAT(/,1X,12(I3,','),I3)
         RETURN 1
C        LEAP=11: options for wpns alive
267   PRINT*, ' WPNS ALIVE ARE TO BE ENTERED FOR EACH CI'
      PRINT*, ' SEPARATELY. TO ZERO OUT THE REMAINDER OF A'
      PRINT*, ' UNIT FOR THE ENTIRE PHASE (ALL CIS INVOLVED)'
      PRINT*, ' USER MUST ENTER 9999 AS 1ST ENTRY AND ANY'
      PRINT*, ' NOS. FOR REMAINING ENTRIES. TO ALLOW 0 DEMAND'
      PRINT*, ' FOR A WPN, 0 MUST BE ENTERED FOR WPNS SHORT'
      PRINT*, ' AND NO RETS MUST BE ENTERED. IF A UNIT HAS'
      PRINT*, ' RETURNS ONLY (NO. OF WPNS SHORT=0), DEMAND'
      PRINT*, ' MUST STILL BE GENERATED (OPT 11=1).'
         RETURN 1
C        LEAP=12: changes inserted by row locations
268   PRINT*, ' TO CHANGE BY ROW, USER ENTERS THE CI NO.'
      PRINT*, ' (1,2,3) CORRESPONDING TO 1st,2nd or 3rd CI'
      PRINT*, ' INVOLVED AND THE ROW (1-6). THE 2ND PROMPT'
      PRINT*, ' ASKS THAT ALL 5 VALUES OF ROW BE ENTERED.'
      PRINT*, ' CIS AND ROWS CAN BE CHANGED IN ANY ORDER.'
      PRINT*, ' UP TO 18 'ROWS' CAN BE CHANGED AT ONE TIME AND'
      PRINT*, ' ROW CHANGES CAN BE COPIED INTO ANOTHER UNIT IF'
      PRINT*, ' THE COPY UNIT OPTION IS SET TO 1. USER WILL BE'
      PRINT*, ' PROMPTED TO ENTER THE UNIT NO. IF NEW CHANGES'
      PRINT*, ' ARE DESIRED.'
249      RETURN 1
C     RETURN
```

```
C        *************************************************
      SUBROUTINE ERRWPN(*)
C        If stored wpn type is not listed, determine which
C        way to proceed: by correcting file or by entering
C        names and expenditure rates.
      PRINT*, ' BECAUSE WPN SYSTEM IN TABLE IS NOT LISTED.'
      PRINT*, ' EITHER THE WPN TYPE MUST BE CHANGED OR THE'
      PRINT*, ' WPN NAME AND EXPENDITURE RATES ENTERED.'
      PRINT*, ' (1=CHANGE WPN TYPE, 0=ADD WPN NAME AND RATES .)'
         READ*, IANS
            IF(IANS.EQ.1)RETURN
               INV(3)=8
               IWPV(KROW,1)=14
            RETURN 1
C     END             ERRWPN
C        ************************************************
      SUBROUTINE VERIFY(II,JJ,*)
C         Verify range of INV variable.  II=INV; JJ=mAXV.
         IF(II.GE.0.AND.II.LE.JJ)RETURN
         PRINT*, ' INAPPROPRIATE ENTRY, PLEASE REPEAT.'
         RETURN 1
C     END             VERIFY
C           *************************
      SUBROUTINE FILERR(*)
C        file manipulation error routine.
555   PRINT*, ' ERROR IN FILE MANIPULATION.'
         CALL WINDOW
         CALL PLIST
            WRITE(6,1555) (INV(L),L=1,15),(IND(M),M=1,12)
909      PRINT*, ' TRY AGAIN? (1=YES)'
            READ*, IANS
              IF(IANS.EQ.1)RETURN 1
1555  FORMAT(/,1X,15I3,2X,12I2)
      STOP
      END                          @MAIN
```

7. UNIVAC EXECUTIVE LANGUAGE RUNSTREAMS.

a. These runstreams assign the files needed to run the programs associated with ARM. They are written for the UNIVAC Symbolic Stream Generator (SSG processor). Instructions on the use of these runstreams are found in Volume I.

b. The SSG runstream needed for running the ARM simulation is as follows:

```
@RETAIN ARMPL.,csintname$.,cts$file.
@ASG,CP RPT[FILES.1,1,1I(+1).,F/100//100
@USE 2.,RPT[FILES,1,1,1I(+1).
@ASG,A  DATAB[FILES,1,1,1I.
@USE 3.,DATAB[FILES,1,1,1I.
@ASG,A  DEMAND*[FILES,1,1,3I3IN.
@USE  9,DEMAND*[FILES.1.1,3I3IN.
@ASG,A  EVT[FILES,1,1,1I.
@USE 7.,EVT[FILES,1,1,1I.
@ASG,CP TDATAB[FILES,1,1.2I(+1).,F///25
@USE 4.,TDATAB[FILES,1,1.2I(+1).
@ASG,CP EVT[FILES,1,1,2I(+1).,F///15
@USE 8.,EVT[FILES,1,1,2I(+1).
@ASG,A EVENTS[FILES.1,1,1I.
@USE 11,EVENTS[FILES,1,1,1I.
@ASG.CP STAT[FILES,1,1,1I(+1).,F///75
@USE 14,STAT[FILES,1,1,1I(+1).
```

c. This runstream assigns the files used in the EDIT program:

```
@RETAIN ARMPL.,csintname$.,cts$file.
@ASG,A TDATAB[EDIT.1,1.2I.
@ASG,CP DATAB[EDIT.1,1,2I(+1).,F///25
@USE 3.,TDATAB[EDIT.1,1,2I.
@USE 4.,DATAB[EDIT,1,1,2I(+1).
@ASG,CP TRKPRT[EDIT,1,1,1I(+1).,F///4
@USE 2,TRKPRT[EDIT,1,1,1I(+1).
@ASG,A DIS4*DISTFILE[EDIT.1,1,2I.
@USE 13,DIS4*DISTFILE[EDIT,1,1,2I.
```

d. **The demand generation program may be accessed by using this runstream:**

```
#RETAIN
*IF [NEW]
*INCREMENT A TO [NUMCIS,1,1,1]
*SET D TO 11+A
#ASG,UP LOGINEW,1,1,AIBIN(+1).
#USE     [*D],LOGINEW,1,1,AIBIN(+1).
*LOOP
*ELSE
*INCREMENT A TO [NUMCIS,1,1,1]
#ASG,A LOGIOLDFILE,1,1.AIBIN.
*SET C TO A+9
#USE [*C],LOGIOLDFILE,1,1.AIBIN.
#ASG,UP LOGINEWFILE.1,1,AIBIN(+1).
*SET D TO 11+A
#USE [*D],LOGINEWFILE,1,1,AIBIN(+1).
*LOOP
*END
*IF [REPORT]
*IF [NEW]
*INCREMENT B TO [NUMCIS,1,1,1]
#ASG,UP LOGRPTINEW,1,1,BI(+1).
*SET D TO 14+B
#USE [*D],LOGRPTINEW,1,1.BI(+1).
*LOOP
*ELSE
*INCREMENT B TO [NUMCIS,1,1,1]
#ASG,UP LOGRPTINEWFILE,1,1,BI(+1).
*SET D TO 14+B
#USE [*D],LOGRPTINEWFILE,1,1,BI(+1).
*LOOP
*END
*END
```